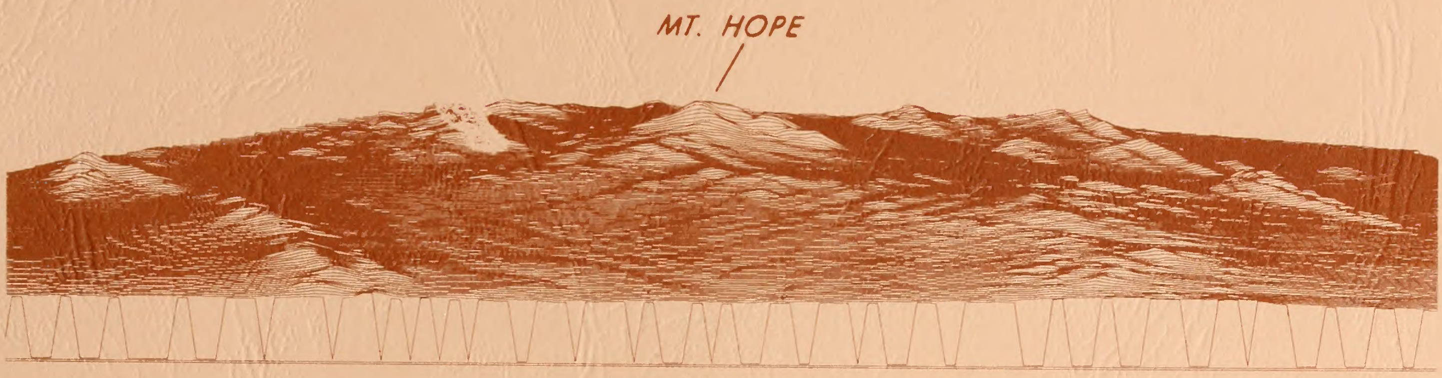
BIOTA

TECHNICAL REPORT NO.6

MT. HOPE MOLYBDENUM PROJECT



View from the south looking north

U.S. DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT
BATTLE MOUNTAIN, NEVADA

DECEMBER 1984

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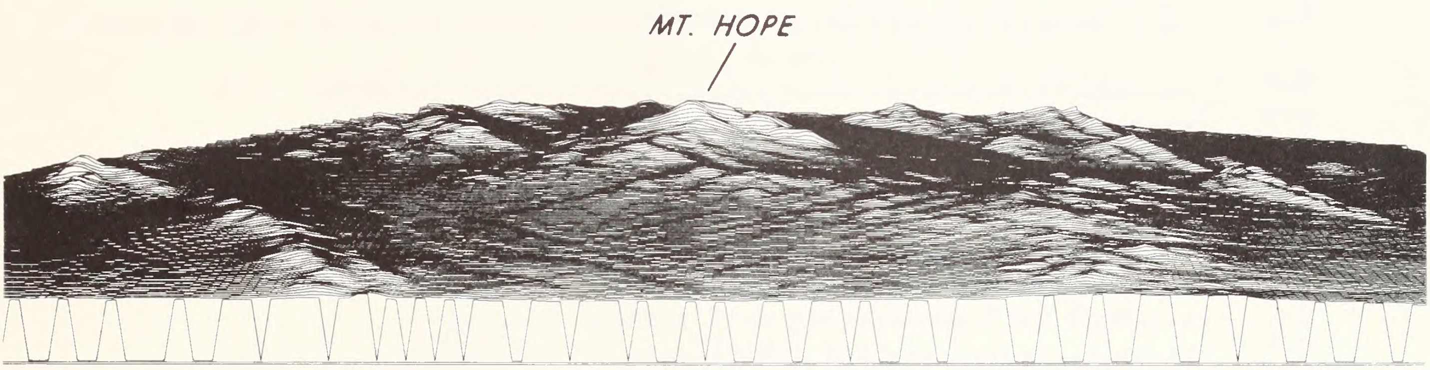


View from the south looking north

U.S. DEPARTMENT OF INTERIOR

BUREAU OF LAND MANAGEMENT

BATTLE MOUNTAIN, NEVADA

DECEMBER 1984

BIOTA
TECHNICAL REPORT NO.6
TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1.0

INTRODUCTION

1.1 Introduction

This technical report presents detailed information concerning the flora and fauna (biota) resource base and any significant potential impacts to that resource base upon implementation of the proposed action and/or alternatives.

1.2 Project Description

Technical Report No.1 and Chapter 2.0 of the Mt. Hope Molybdenum Project EIS detail the proposed action and alternatives. In brief, the Mt. Hope Molybdenum Project Environmental Impact Statement (EIS) (including Technical Report Nos.1 thru 9) have been prepared in response to an EXXON Minerals Company (EXXON) proposal submitted to the Bureau of Land Management (BLM) for the purchase of public lands under Section 203 of the Federal Land Policy and Management Act (FLPMA) of 1976. Although the land purchase proposal is the action which occasions the Environmental Impact Statement (EIS) process, there are other federal decisions which must be made before EXXON may proceed. Among these are the granting of power, water line and highway relocation rights-of-way and the approval of a plan-of-operation.

The primary purpose of the proposed sale of public lands involves the planned activities of EXXON which has for some time been conducting preliminary feasibility studies assessing the development of a molybdenum deposit in the vicinity of Mt. Hope near Eureka, Nevada. As part of the EIS process, EXXON has detailed its preliminary plans concerning project development. The Mt. Hope project includes the development of an open-pit mine, non-mineralized material storage areas (2), a process plant complex of approximately 100 acres and a tailings material disposal site. As support features to the project, a proposed water line and power line would also be necessary. The proposed tailings pond site would, if implemented, require an approximate six mile relocation of an existing state highway (State Route 278).

Figures 1-1 through 1-8 show project area location and depict the proposed action and alternatives (except the location of a subdivision plat). Table 1-1 outlines the components of the proposed action and alternatives, including the no action alternative.

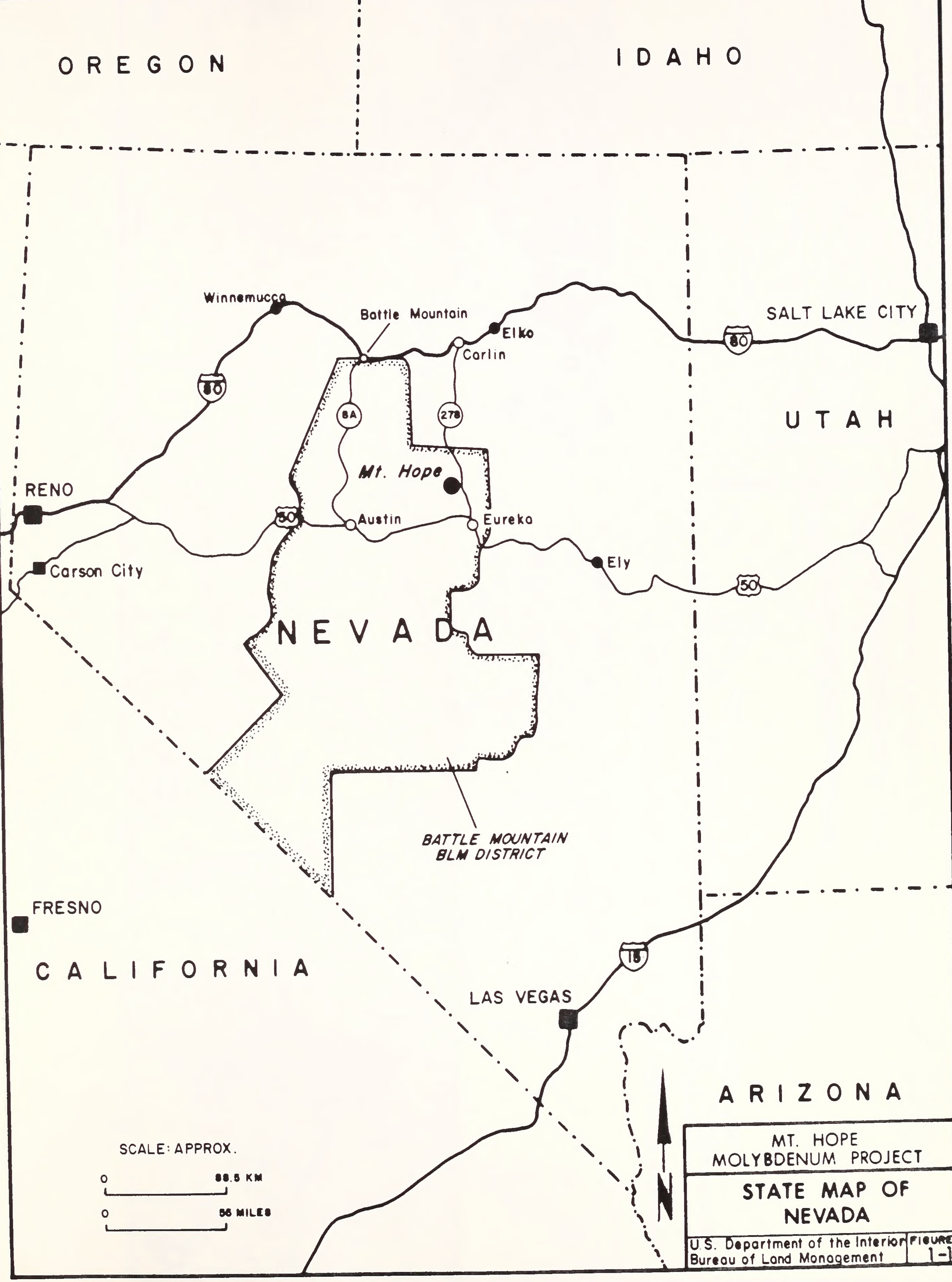
1.3 Baseline Data Development

Early in the EIS process, the BLM and EXXON agreed in a Memorandum of Understanding (MOU) that the EIS process of data collection, analysis and documentation would be assisted by the involvement of an independent third party consultant, Wyatt Research and Consulting, Inc. (WRC). WRC initiated its involvement as an oversight quality assurance consultant in the development of a project source document for subsequent use in developing the Mt. Hope Molybdenum Project EIS. Entitled the Mt. Hope Molybdenum Project Environmental Impact Report (EIR), the source document included two chapters of information concerning environmental resources (baseline data and impact analyses) and prepared by WRC with assistance from the BLM and available study results of EXXON (e.g., cultural resources consultant report, geology, etc.). During the preparation of the source document and continuing throughout the EIS process, WRC has collected, reviewed and analyzed pertinent data in each of the necessary topical areas of environmental resources. Several reconnaissance surveys were conducted by WRC biologists and vegetation specialists. The surveys were conducted primarily to ground-truth vegetation mapping and to observe habitat presence and type.

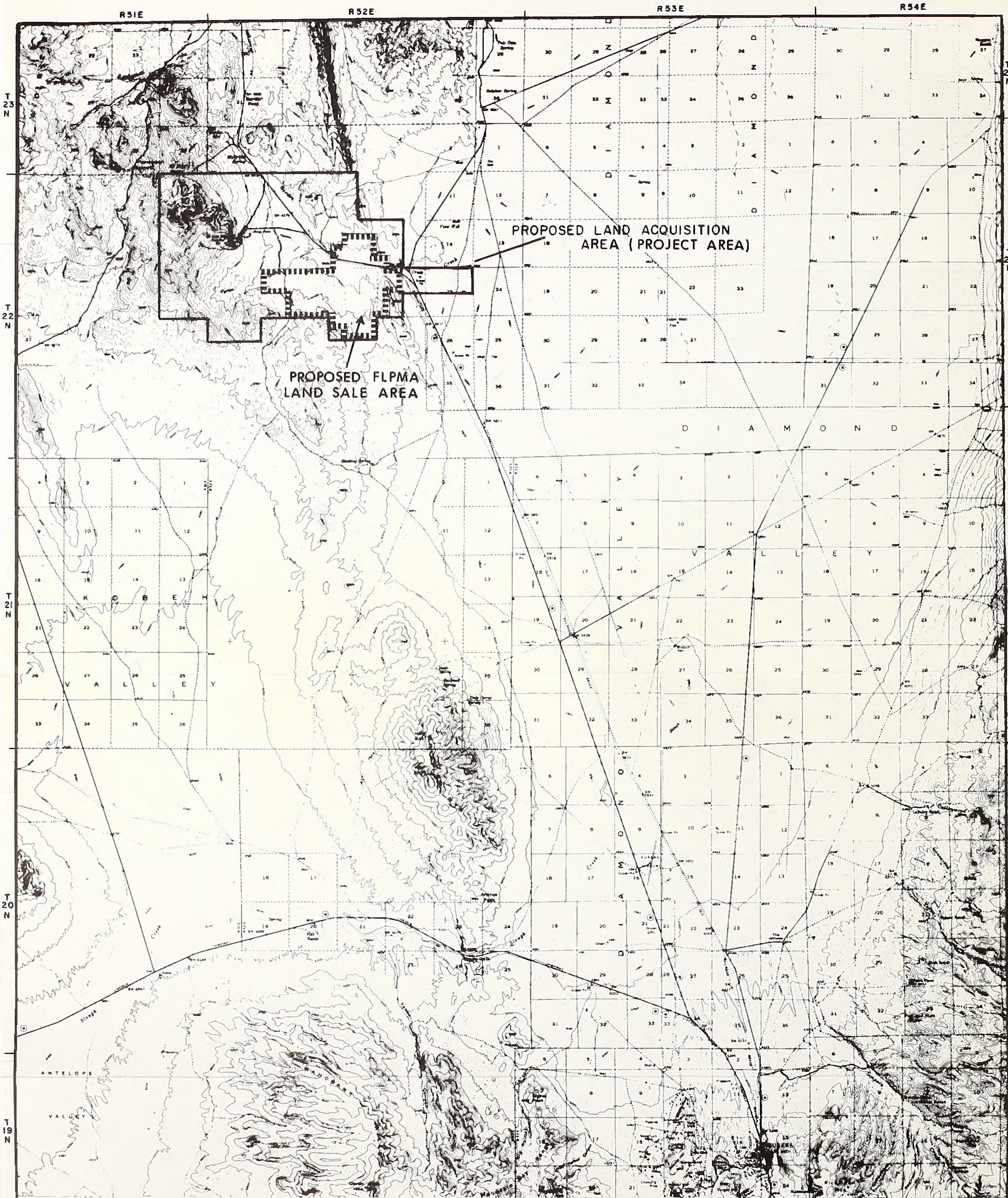
This technical report documents the majority of information gathered and analyzed that was pertinent to flora and fauna resources. The primary sources of biologic resource information included the following:

1) Billings, W. D. 1951. "Vegetational Zonation in the Great Basin of Western North America," pp. 101-122. In Compt. Rend. du Colloque sur les Bases Ecologiques de la Regeneration de la Vegetation des Zones Arides. Paris: Union Internat. Soc. Biol.

2) Cronquist, A., A. H. Holmgren, N. H. Holmgren, and J. L. Reveal. 1972. Plant Geography of the Intermountain Region. In Arthur Cronquist, et al. Intermountain flora - Vascular Plants of the Intermountain West,



OREGON
IDAHO
Winnemucca
Battle Mountain
Elko
Carlin
SALT LAKE CITY
80
8A
278
UTAH
Mt. Hope
RENO
50
Austin
Eureka
Carson City
Ely
NEVADA
BATTLE MOUNTAIN BLM DISTRICT
FRESNO
CALIFORNIA
15
LAS VEGAS
ARIZONA
N
SCALE: APPROX.
0 88.5 KM
0 55 MILES
MT. HOPE MOLYBDENUM PROJECT
STATE MAP OF NEVADA
U.S. Department of the Interior
Bureau of Land Management
FIGURE 1-1



——— PROPOSED LAND ACQUISITION AREA (PROJECT AREA)

▮▮▮▮▮▮▮▮ ESTIMATION OF APPROXIMATE FEDERAL LAND POLICY AND MANAGEMENT ACT (FLPMA) SALE AREA

Nevada MAP AREA

N

0 1 2 3 4 5 Miles

0 1 2 3 4 5 6 7 8 Km.

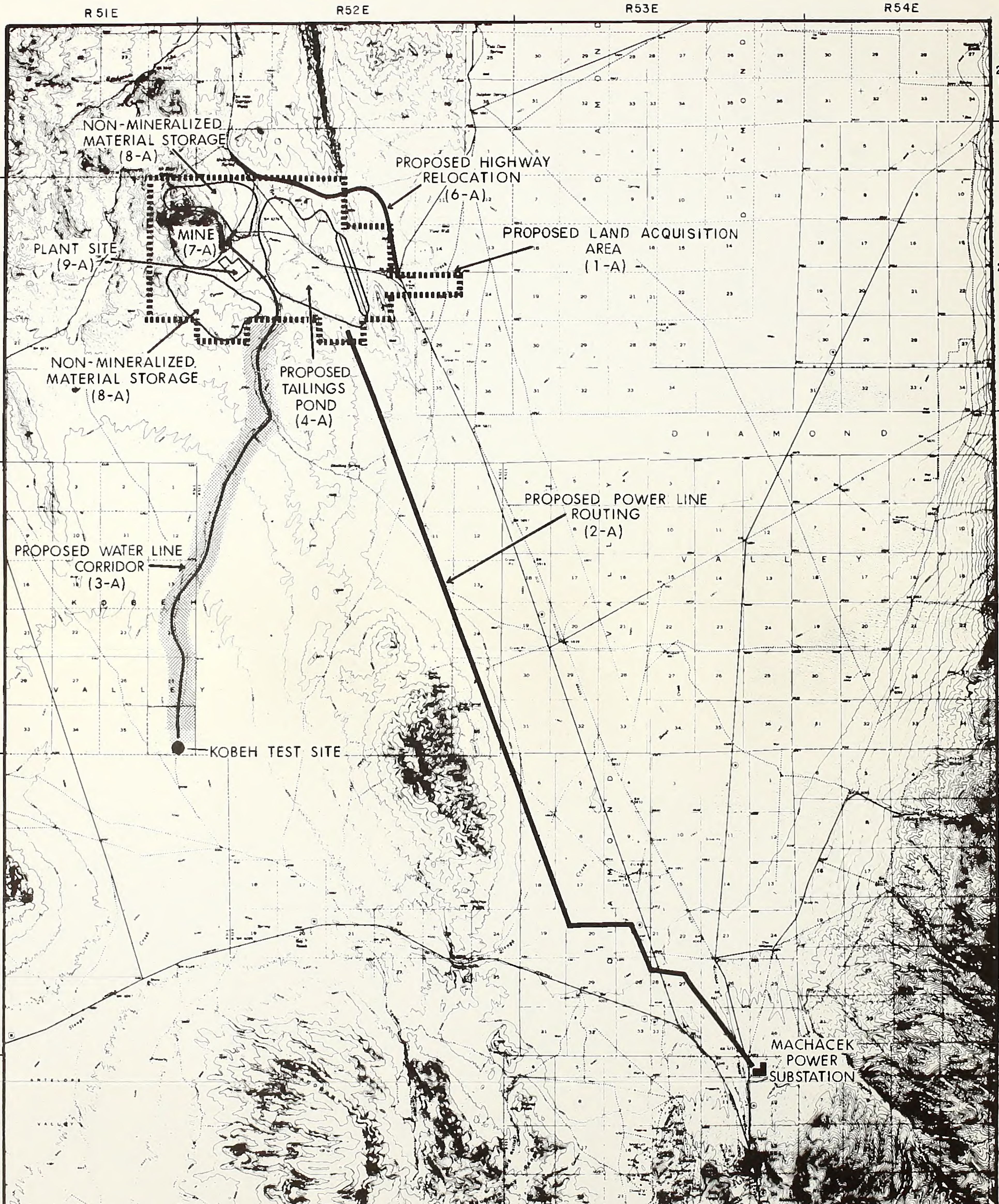
BASE: USGS TOPO QUADRANGLES, GARDEN VALLEY, WHISTLER MTN., DIAMOND SPRINGS & EUREKA, NEVADA.

MT. HOPE MOLYBDENUM PROJECT

PROPOSED PROJECT AND LAND ACQUISITION AREA MAP ALTERNATIVE 1-A

U.S. Department of the Interior
Bureau of Land Management

FIGURE 1-2



PROPOSED LAND ACQUISITION AREA BOUNDARY

*NOTE: COMPONENT 5-A (HOUSING SUBDIVISION) NOT SHOWN. ALTERNATIVE 1-A (INCLUDING FLPMA LAND SALE AREA) SHOWN ON FIGURE 2-1.

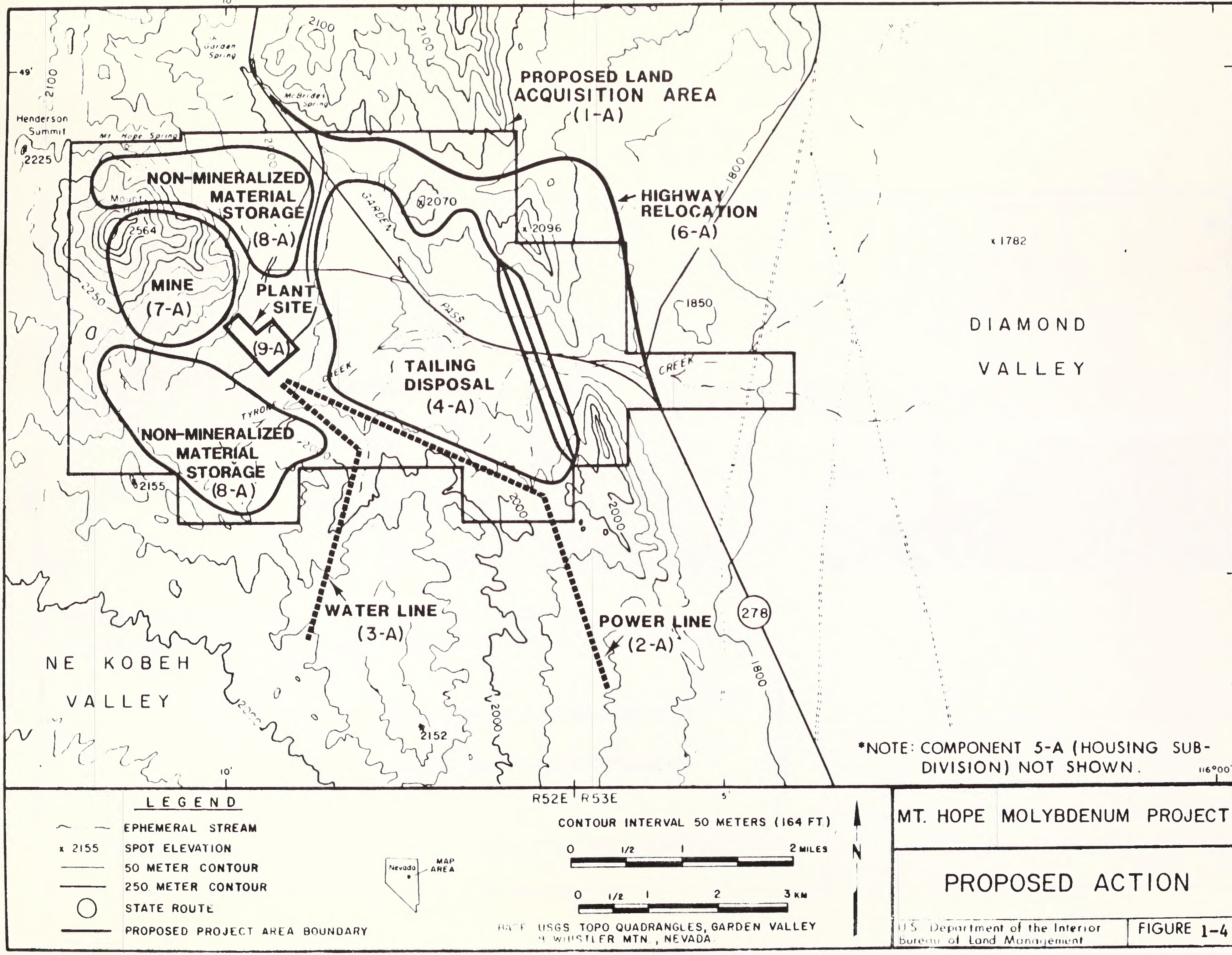
BASE: USGS TOPO QUADRANGLES, GARDEN VALLEY, WHISTLER MTN., DIAMOND SPRINGS & EUREKA, NEVADA.

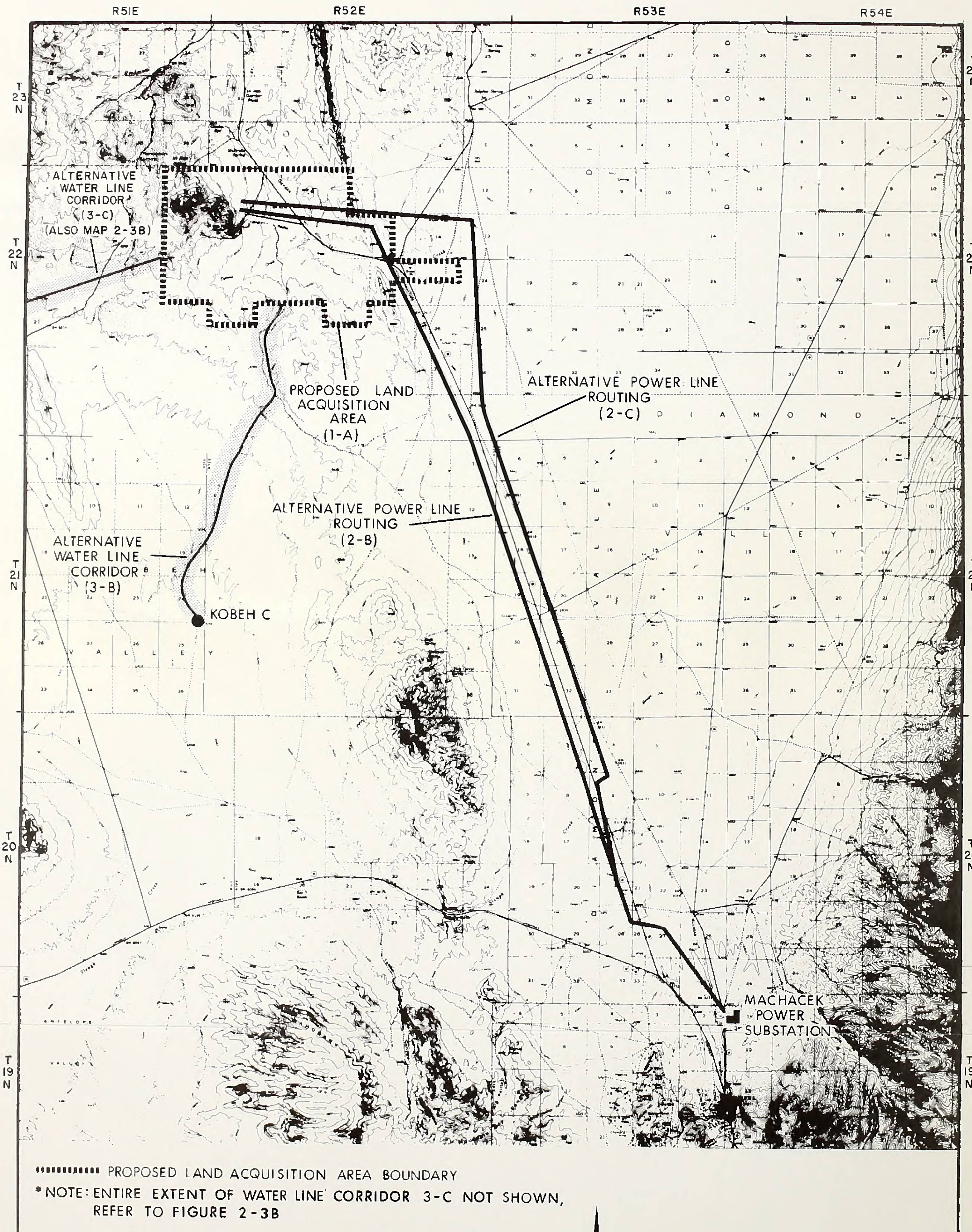
MT. HOPE MOLYBDENUM PROJECT

REGIONAL STUDY AREA MAP SHOWING PROPOSED ACTION COMPONENTS

U.S. Department of the Interior
Bureau of Land Management

FIGURE 1-3


PROPOSED LAND ACQUISITION AREA (1-A)
HIGHWAY RELOCATION (6-A)
NON-MINERALIZED MATERIAL STORAGE (8-A)
MINE (7-A)
PLANT SITE (9-A)
TAILING DISPOSAL (4-A)
NON-MINERALIZED MATERIAL STORAGE (8-A)
WATER LINE (3-A)
POWER LINE (2-A)
DIAMOND VALLEY
NE KOBEH VALLEY
Henderson Summit
2225
Mt Hope Spring
Garden Spring
McBrides Spring
Mount Hope
2564
2070
2096
1850
1782
2155
2152
GARDEN
PASS
CREEK
TYRONE
278
1800
2000
2100
2250
R52E R53E
116°00'
39°45'
49'
10'
5'
T 23 N
T 22 N
T 21 N
*NOTE: COMPONENT 5-A (HOUSING SUB-DIVISION) NOT SHOWN.
LEGEND
EPHEMERAL STREAM
x 2155 SPOT ELEVATION
50 METER CONTOUR
250 METER CONTOUR
STATE ROUTE
PROPOSED PROJECT AREA BOUNDARY
Nevada
MAP AREA
CONTOUR INTERVAL 50 METERS (164 FT)
0 1/2 1 2 MILES
0 1/2 1 2 3 KM
N
BASE USGS TOPO QUADRANGLES, GARDEN VALLEY & WHISTLER MTN., NEVADA
MT. HOPE MOLYBDENUM PROJECT
PROPOSED ACTION
U.S. Department of the Interior
Bureau of Land Management
FIGURE 1-4

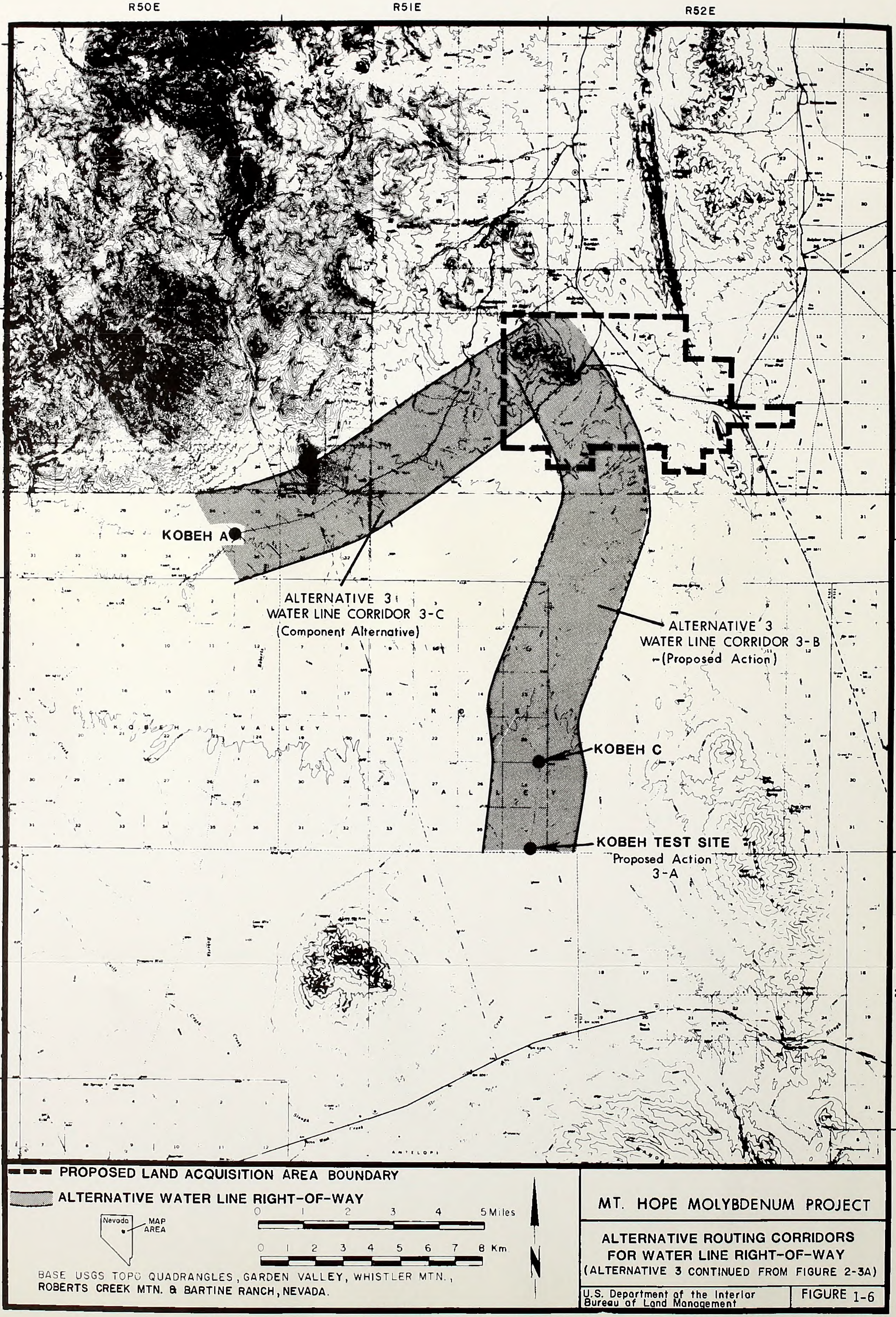


MT. HOPE MOLYBDENUM PROJECT

REGIONAL STUDY AREA MAP SHOWING ALTERNATIVE COMPONENTS 2 AND 3 TO THE PROPOSED ACTION

U.S. Department of the Interior
Bureau of Land Management

FIGURE 1-5



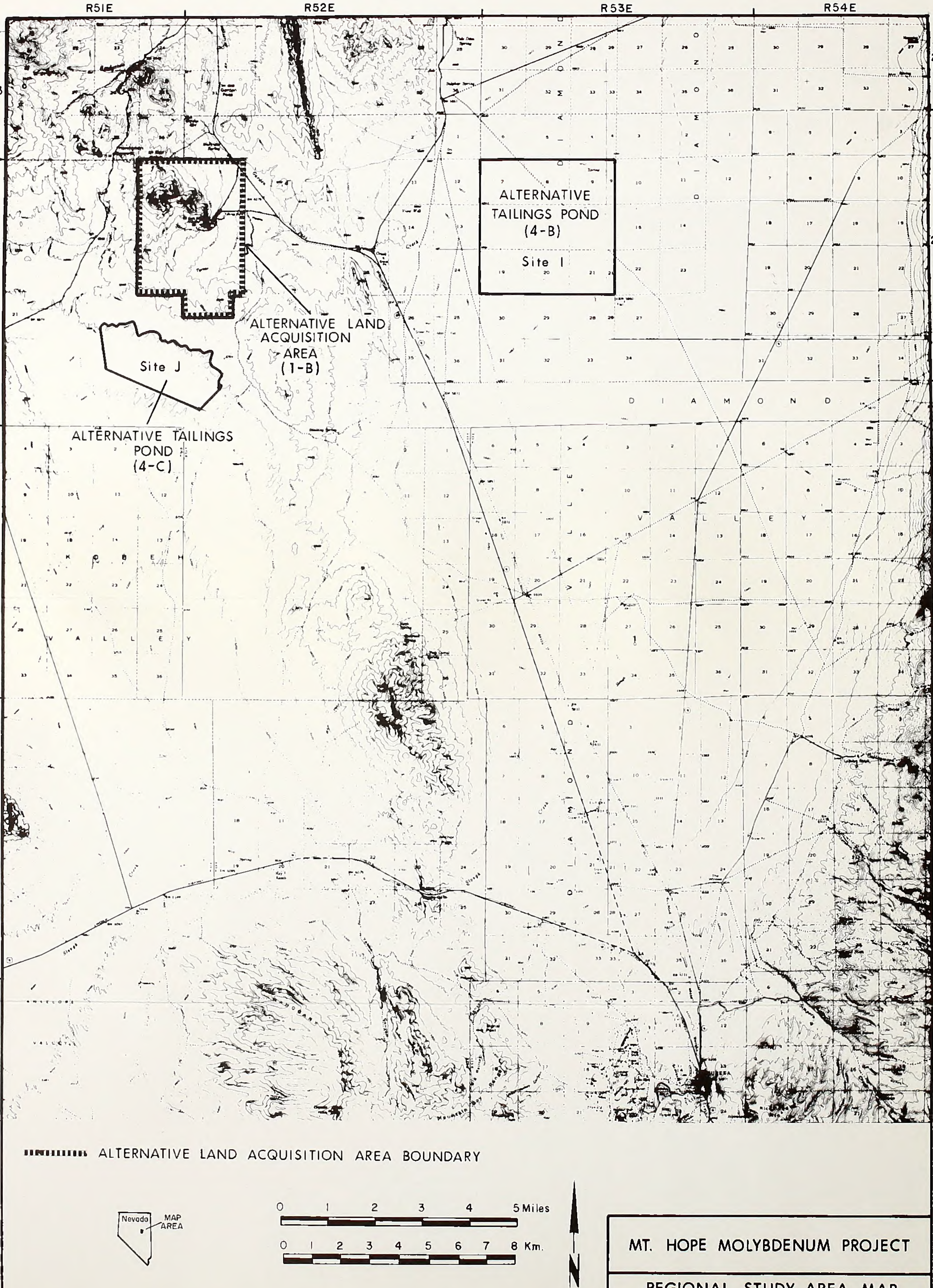
MT. HOPE MOLYBDENUM PROJECT

ALTERNATIVE ROUTING CORRIDORS FOR WATER LINE RIGHT-OF-WAY

(ALTERNATIVE 3 CONTINUED FROM FIGURE 2-3A)

U.S. Department of the Interior
Bureau of Land Management

FIGURE 1-6

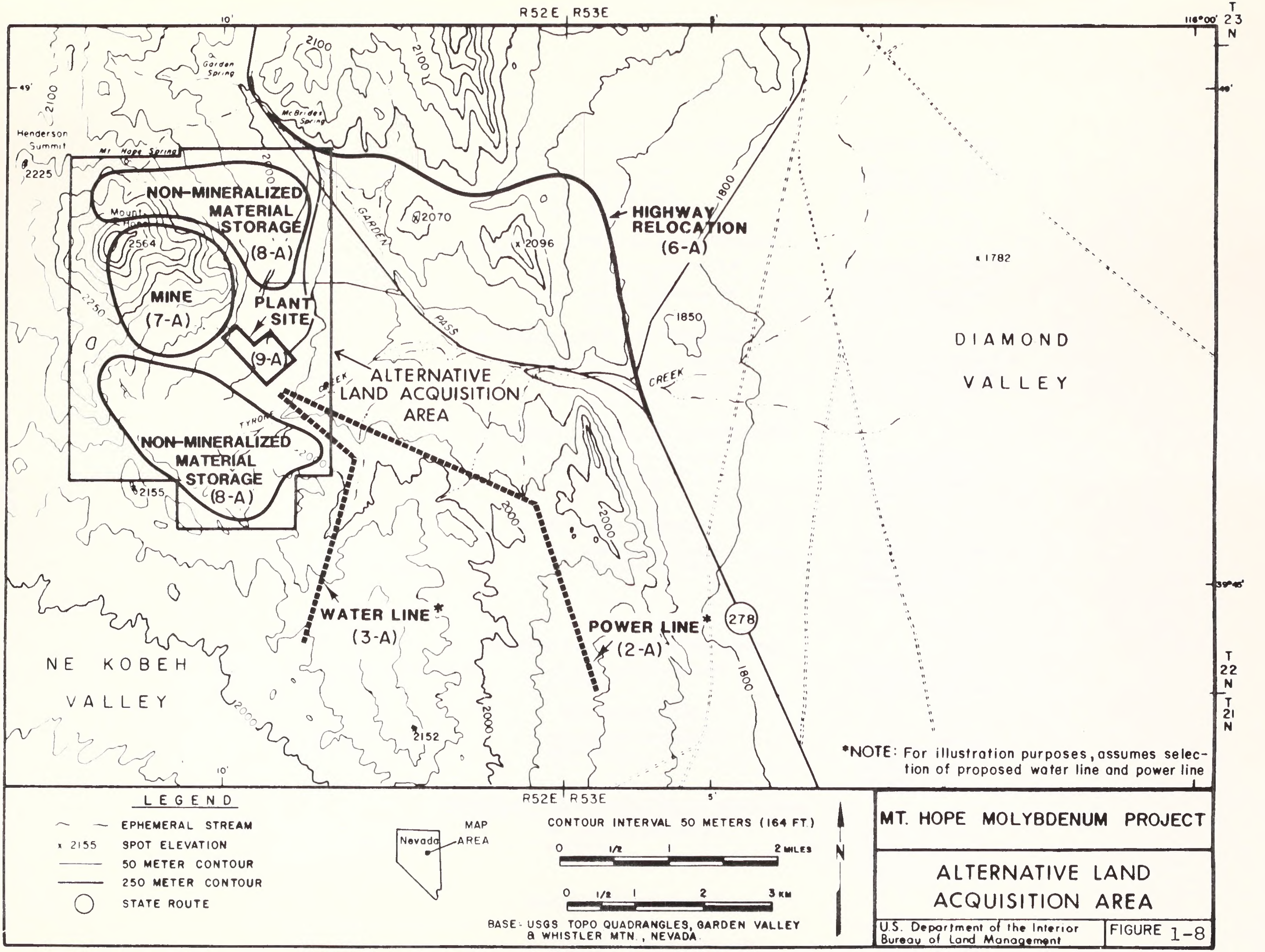


MT. HOPE MOLYBDENUM PROJECT

REGIONAL STUDY AREA MAP SHOWING ALTERNATIVE COMPONENT 4 TO THE PROPOSED ACTION

U.S. Department of the Interior
Bureau of Land Management

FIGURE 1-7



MT. HOPE MOLYBDENUM PROJECT

ALTERNATIVE LAND ACQUISITION AREA

U.S. Department of the Interior
Bureau of Land Management

FIGURE 1-8

Table 1-1 Summary Details of the Proposed Action and Alternatives Including the No Action Alternative

Proposed Action		No Action Alternative
	Alternative 1 - Land Acquisition Components	
1-A Land Sale by FLPMA	1-B Mineral Claims 1-C Land Use Lease 1-D Land Use Permit 1-E Land Exchange	Negative or no decision regarding land sale.
	Alternative 2 - Power Line Routing Components	
2-A Power Line Routing A (Figure 1-2)	2-B Alternative Routing 2-B (Figure 1-4) 2-C Alternative Routing 2-C (Figure 1-4)	No power line right-of way granted. Assumes the Mt. Hope Project will not proceed.
	Alternative 3 - Water Line Routing Components	
3-A Water Line Routing A (Figure 1-2)	3-B Alternative Routing 3-B (Figure 1-4) 3-C Alternative Routing 3-C (Figure 1-5)	No water line right-of-way granted. Assumes the Mt. Hope Project will not proceed.
	Alternative 4 - Tailings Pond Sites Components	
4-A Tailings Pond at Location 4-A (Figure 1-3)	4-B Alternative Site 4-B 4-C Alternative Site 4-C (Figure 1-4)	Not part of federal decision-making. Assumes no project implementation.
	Alternative 5 - Housing	
5-A Subdivision (Not shown on figure)	5-B Decentralized Workforce Housing (Not shown on figure)	Not part of federal decision-making. Assumes no project implementation.
	Alternative 6 - Highway Relocation Component	
6-A Highway Relocation Routing 6-A (Figure 1-3)	No reasonable alternatives available	No road relocation right-of-way granted.
	Alternative 7 - Mine	
7-A Mine at Location 7-A (Figure 1-3)	No reasonable alternatives available	Not part of federal decision-making. Assumes no project implementation.
	Alternative 8 - Non-Mineralized Material Storage Areas	
8-A Non-Mineralized Material Storage at Location 8-A (Figure 1-3)	No reasonable alternatives available	Not part of federal decision-making. Assumes no project implementation.
	Alternative 9 - Process Plant	
9-A Process Plant at Location 9-A (Figure 1-3)	No alternatives proposed. (Proposed action is worst-case. See text).	Not part of federal decision-making. Assumes no project implementation.

Vol. 1, pp. 77-175. For New York Botanic Garden, by Hafner Publishing Co., New York.

3) Federal Register. 1980. Vol. 45, no. 242. Review of Candidate Plant Species for Threatened or Endangered Status. December 15.

4) Federal Register. 1982. Vol. 47, no. 251. Review of Vertebrate Wildlife for Listing as Endangered or Threatened Species. December 30.

5) Henningson, Durham and Richardson (HDR). 1980a. M-X Environmental Technical Report (ETR) 14, Vegetation Report.

6) HDR. 1980b. ETR-15, Wildlife.

7) HDR. 1980c. ETR-16, Aquatic Habitats and Biota.

8) HDR. 1980d. ETR-17, Protected Species.

9) HDR. 1980e. ETR-18, Wilderness and Significant Natural Areas.

10) Mozingo, H. N., Williams, M. 1980. Threatened and Endangered Plants of Nevada. May.

11) Nevada Department of Wildlife. 1983. Larry Barngrover letter and map regarding mule deer migration routes, January 26.

12) United States Department of the Interior (U.S.D.I.), Bureau of Land Management. No date. "Birds of the Battle Mountain BLM District." Battle Mountain District Office, Nevada.

13) U.S.D.I., Bureau of Land Management. No date. "Habitat Management Series for Unique or Endangered Species." Report No.7 Golden Eagle T/N 239.

14) U.S.D.I., Bureau of Land Management. No date. "Mammals of the Battle Mountain BLM District." Battle Mountain District Office, Nevada.

15) U.S.D.I., Bureau of Land Management. 1964. Range Management Survey.

16) U.S.D.I., Bureau of Land Management. 1973. "Fishes of the Battle Mountain BLM District." Battle Mountain District Office. September.

17) U.S.D.I., Bureau of Land Management. 1974. "Amphibians and Reptiles of the Battle Mountain BLM District." Battle Mountain District Office. August.

18) U.S.D.I., Bureau of Land Management. 1976. "Nesting Ecology of Golden Eagles in Elko County, Nevada." T/N 281 February.

19) U.S.D.I., Bureau of Land Management. 1981. "Palomino Valley Wild Horse and Burro Placement Center." C. C. Publication 21. Carson City District, Nevada.

20) U.S.D.I. 1982a. Special Habitat Feature Survey (Integrated Habitat Inventory and Classification System). January.

21) U.S.D.I., Bureau of Land Management. 1983a. Orthophotographic Maps of Vegetation, Range Survey Data. 1964.

22) U.S.D.I., Bureau of Land Management. 1983b. Results of 1983 Mid-winter Eagle Survey, Battle Mountain District, January.

23) U.S.D.I., Bureau of Land Management. 1983c. Results of 1983 Sage Grouse Strutting Ground Survey. Battle Mountain District, March.

24) U.S.D.I., Bureau of Land Management. 1983d. Battle Mountain District Office Memorandum dated March 25, 1983. Re: NNNPS endangered threatened plant species decisions/recommendations.

25) U.S.D.I., Bureau of Land Management. 1984. Final Shoshone-Eureka Resource Management Plan and Environmental Impact Statement. Battle Mountain District, Nevada.

26) Wyatt Research and Consulting, Inc. (WRC). 1983. Field Notes of Site Visitations. January, March, May, June, July.

As necessary, the manner in which the data reported in the referenced sources was collected is discussed in appropriate sections (e.g., details concerning collection of data regarding Special Habitat Features).

1.4 Impact Analyses Methodology

In the event of any discrepancies between this technical report and the EIS, the material presented in the EIS shall supercede that which is presented in this technical report.

1.4.1 Vegetation

Determination of potential impacts resultant of implementing the proposed action and/or alternatives emphasized analysis of: 1) Site specific vegetation type determination; 2) quantitative estimation of forage value losses; 3) reclamation success potential; and, 4) impact to rare, endangered or threatened flora, if any.

Site Specific Vegetation Analyses. Vegetation typing of the EXXON Mt. Hope (Nevada) study area consisted of two phases: a preliminary mapping phase (conducted in the office) and, a field verification phase.

The former was accomplished during March of 1983. Existing vegetation type maps prepared by the U.S. Geological Survey (USGS) and Soil Conservation Service (SCS) were studied to determine the extent and occurrence of vegetation types within the study area. These vegetation type maps were prepared on orthophoto quads (Garden Valley SE, Nev. and Garden Valley SW, Nev.) at a scale of 1:24,000. Delineation of vegetation types for this project was accomplished by examining color infrared (CIR) prints (1:18,000) of the study area with an Old Delft scanning stereoscope. Dimensionally stable polyester overlays were taped to the CIR prints. Subsequently, vegetation type delineations were drawn onto the overlays. By examining the orthophoto quads and the CIR prints, it was possible to assign certain "textures" and color

signatures to the different vegetation types. The presence of these "textures" and color signatures on the CIR prints was the basis for the delineation of specific vegetation types. In addition, "true color" prints (1:18,000) were examined to supplement the CIR prints. Following photointerpretation, the vegetation type delineations on the overlays were transferred to a base map and converted to a scale of 1:24,000 by using a map-o-graph (model 55c). All

mapping thus produced was analyzed for comparison with available BLM orthophotograph maps.

Field verification of the vegetation typing occurred between July 25-27, 1983 and consisted of walking and/or driving through the study area. Vegetation types were delineated based on the gross morphological aspect of particular plant communities. The delineations were named after the two or three dominant taxa. A list of flora observed was compiled. Species with adequate vegetative characteristics were collected and "keyed out". Photographs were taken of the major vegetation types. Wildlife and livestock observations which were made during the vegetation typing were noted.

Forage Value Losses. Calculations of forage losses, both short and long term, were derived by simulating proposed action and/or alternative action disturbances upon the vegetation mapping produced during Phase I data confirmation. Acreages of disturbed area were planimetered and recorded for corresponding AUM value data available from the BLM 1964 range survey mapping. Forage values were calculated on direct basis with the 1964 survey data and then extended ±10 percent to account for annual climatic variation. Total AUM counts were reviewed with the grazing permittee of the Romano Allotment for general confirmation of actual use encountered.

Reclamation Success Potential. Factors which might limit successful reclamation, both environmental and engineering based, were determined specific to the Mt. Hope environs and the proposed and/or alternative plans. Scientific research results reported in literature and professional experience pertinent to a wide variety of semi-arid areas were utilized to evaluate the potential for reclamation success and to then identify and describe methodologies which have been utilized to anveliorate the effects of limiting factors. The

literature-based studies reviewed involved lands most of which had environmental conditions similar to, or more stressful for plant growth, than those existing at Mt. Hope.

Data presented in Technical Reports No.1 (EXXON Project Description), No.2 (Topography and Geology), No.3 (Meteorology and Air Quality) and No.5 (Soils) was utilized extensively in the analysis of reclamation success potential.

Rare, Endangered and Threatened Species. Analysis of the potential for rare, endangered and/or threatened species occurring within or proximal to the proposed action and alternatives areas included both a review of literature based information and field survey reconnaissance. Analytical emphasis was placed on the information provided by the extensive work reported by Mozingo and Williams, 1980 and the collective data reported in the M-X EIS/ETRs (HDR, 1980). Field surveys of vegetation typing included observation emphasis on any potential sightings of clokey pincushion cactus (*Corypantha vivipara*), one-leaflet Torrey milkvetch (*Astragalus calycosus*), Watson oxytheca (*Oxytheca watsonii*) and *Lepidium nanum*, a mustard.

1.4.2 Fauna

Potential impacts were determined by imposing the environmental loadings (e.g., disturbance, obstruction, etc.) of the proposed action and alternatives upon the faunal resource base identified. Analyses were generally conducted by species type, primarily due to the variable quantification of data on a similar basis (e.g., sage grouse counts field conducted but not such counts available for mule deer). Where sufficient data was lacking for the purposes of quantitative analyses, identification of impacts and evaluation of significance thereof utilized both literature-based study results and the expertise of area/regional/state biologists (e.g., Nevada Department of Wildlife and BLM specialists).

The manner in which individual species were evaluated in terms of sensitivity to impact is discussed in individual relevant sections (e.g., sage grouse impact as defined by two-mile radius of influence).

1.4.3 Special Habitat Features

The extent to which project area Special Habitat Features (SHFs) might be affected by implementation of the proposed action and/or alternatives was assessed in terms of (1) actual physical destruction/disturbance of SHF anticipated by project planning and (2) potential for influence zone effects in SHF areas near disturbance activity (e.g., avoidance of potential nesting areas as a result of mine operation noise.)

1.4.4 Rare, Endangered and Threatened Species

Determination of impact to rare, endangered or threatened species was based on a worst-case criteria involving assumed destruction/elimination of species if occurring on site. Species of known Eureka County occurrence but located beyond project activity areas were assumed to be unaffected unless potential habitat existed on-site and sufficient probability of occurrence on-site required additional analyses. In the case of candidate species (under consideration for listing as rare, endangered or threatened), impact assessment was governed by BLM policy which in most cases dictates that such species be handled as if designation of rare, endangered, or threatened status had been attained. The exception to the general policy exists in the case of several plant species originally put forth as candidates but subsequently evaluated by the Northern Nevada Native Plant Society as being inappropriate for further consideration (BLM, Battle Mountain Bulletin N60-EB2-13, 1981; status unchanged in 1983).

1.4.5 Wilderness Study Area Impacts

A comprehensive analysis of regional resource management impacts upon the Roberts Wilderness Study Area (NV-060-541) and criteria of nomination has been reported in the Shoshone-Eureka Resource Management Plan and Environmental Impact Statement (BLM, 1983). Analyses specific to the Mt. Hope proposed action were primarily limited to assessment of land tenure adjustments in the Resource Area.

In order to provide additional analyses specific to the Mt. Hope

proposed action and/or alternatives, various evaluations were conducted as part of the EIS process described herein. Analyses included determination of visual resource impacts, noise impacts, air quality impacts and miscellaneous secondary impacts (e.g., increased visitation brought about by anticipated project populations).

CHAPTER 2.0

BASELINE BIOTA DESCRIPTION

2.0 Regional Vegetation

Nevada is dominated by arid shrublands in the valleys and by woodlands, brushlands and sparse forests in the mountain ranges.

On a floristic basis, much of Nevada falls within the Intermountain Sagebrush Province (Bailey, 1978), which is essentially coextensive with the Great Basin Physiographic Province. A small area in southern Nevada and southwestern Utah is part of the Mojave Desert, falling within the Hot Desert Floristic Province.

The Intermountain Sagebrush Province is divided into five sections, three of which are in central and eastern Nevada. The majority of the region falls within the Great Basin Sagebrush Section. This is basically synonymous with the Central Great Basin floristic section as defined by Cronquist, et al. (1972), an area of about 30,250 square miles (78,347 km^2). The two other sections are the Sagebrush-Wheatgrass and the Bonneville Saltbrush-Greasewood, the latter of which extends along the Nevada-Utah border.

Billings (1951) has divided the Great Basin vegetation into more specific zones, the divisions having a characteristic vegetation and an elevational limit. The valley floors and bajadas are divided into three zones: creosote bush, shadscale, and sagebrush-grass zones. The mountainous areas are divided into three montane series: Sierra, Basin Range and Wasatch; the Basin Range and Wasatch series overlap in the eastern Great Basin. A detailed discussion of the zones and series as defined by Billings (1951) follows.

2.1.1 Creosote Bush Zone

Dominated by creosote bush (*Larrea divaricata*), this zone covers much of the Mojave Desert. The creosote bush zone penetrates lower valleys of southeastern Nevada where it intermingles with the shadscale zone.

2.1.2 Shadscale Zone

The shadscale zone in eastern Nevada is very limited and is present only in the lower valleys below 4,500 feet (1,372 m) (Billings, 1949). As the name implies, this zone is dominated by shadscale (Atriplex confertifolia) which often exists as pure stands on heavy silty soils in dry valleys of the Great Basin. Other important woody shrubs in the vegetational matrix of this zone are spiny-hop sage (Grayia spinosa), Nevada joint fir or Morman tea (Ephedra nevadensis), bud sage (Artemisia spinescens), winterfat (Eurotia lanata) and horsebrush (Tetradymia spp.). Perennial herbs include Indian ricegrass (Oryzopsis hymenoides) and galleta grass (Hilaria jamesii). Within the shadscale zone are several "edaphically controlled communities", such as those on saline soils and dunes where shadscale is not dominant (Billings, 1951:109; Fautin, 1946:265-272). In areas of high salinity, greasewood (Sarcobatus vermiculatus), salt grass (Distichlis sp.) and pickleweed (Allenrolfea occidentalis) communities predominate. In other areas, depending upon the soil, moisture and topography, communities of Tetradymia, Eurotia lanata, and black sage (Artemisia nova) can be found. In areas of extreme saline and alkaline conditions, such as on the playas and salt flats, there is little or no plant growth.

2.1.3 Sagebrush Zone

Above 4,500 feet (1,370 m), the shadscale zone is replaced by sagebrush (Artemisia tridentata) and various grasses. Other characteristic plants of this zone are Tetradymia glabrata, green joint fir or Mormon tea (Ephedra viridis), and rabbitbrush (Chrysothamnus spp.). Dominant grasses are wheatgrass (Agropyron spicatum), needle-and-thread grass (Stipa comata), Indian ricegrass and galleta grass. Other perennial grasses and herbs include three-awn grass (Aristida longiseta), balsam root (Balsamorhiza sagittata), phlox (Phlox sp.), milk vetches (Astragalus uintahensis and A. cibarius), Eriogonum sp., and Castilleja sp. Introduced species resulting from burning, cultivation, over-grazing, clearing, and other ecological disturbances attributable to man include brome or cheat grass (Bromus tectorum), Russian thistle, pigweeds (Amaranthus spp.), and sunflower (Helianthus annuus) (Fautin, 1946: 272-273; Billings, 1951: 110-112).

2.1.4 Basin Range Series

2.1.4.1 Pinyon-Juniper Zone

The pinyon-juniper zone is above the sagebrush zone and the lowest zone in the Basin Range series. It is an open woodland dominated by single-needle pinyon (*Pinus monophylla*) and Utah or Western juniper (*Juniperus osteosperma*) interspersed with many of the species found in the sagebrush-grass zone. This zone varies in elevation from 5,000 feet (1,542 m) at the lower tree limit to 8,000 feet (2,438 m) at its upper limit.

2.1.4.2 Upper Sagebrush-Grass Zone

The upper sagebrush-grass zone lies above the pinyon-juniper woodland zone and contains many of the species present in the lower sagebrush zone in addition to mountain mahogany (*Cercocarpus ledifolius*) and quaking aspen (*Populus tremuloides*).

2.1.4.3 Limber Pine-Bristlecone Pine Zone

Moving upward from the upper sagebrush-grass zone, the limber pine-bristlecone pine zone occurs, beginning at about 10,000 feet (3,038 m). This zone is the open, subalpine forest dominated by limber pine (*Pinus flexilis*), and, at higher elevations, bristlecone pine (*Pinus longaeva* Bailey). In the northern Great Basin, other members of the Pinaceae Family are also present in this subalpine forest (Critchfield and Allenbaugh, 1969).

2.1.4.4 Alpine Tundra Zone

The Basin Range alpine tundra zone is present in the higher ranges of the Great Basin, such as the East Humboldt, Ruby, Grant, Schell Creek and Snake ranges in eastern Nevada. Vegetation in this treeless zone is composed of low perennial herbs.

2.1.5 Wasatch Series

Billings' (1951:118-119) vegetational zones for the Wasatch series illustrate the flora in this portion of the Coloradan biotic province. The vegetation of this series is quite similar to that of the central Rocky Mountains. Even so, a transition to the Wasatch vegetation can be observed in the ranges of eastern Nevada and western Utah, where small stands of spruce and fir grow at high elevations on north-facing slopes.

In the Wasatch Range, the oak-maple zone replaces the sagebrush-grass zone above 5,000 feet (1,524 m). Gambel oak (*Quercus gambelii*), bigtooth maple (*Acer grandidentatum*), and Rocky Mountain maple (*A. glabrum*) are the dominant species in this zone. At about 7,500 feet (2,286 m), the white fir-Douglas fir-blue spruce zone succeeds the oak-maple vegetation. The dominant species are white fir (*Abies concolor*), Douglas fir (*Pseudotsuga taxifolia*), blue spruce (*Picea pungens*), yellow pine (*Pinus ponderosa*), and quaking aspen (*Populus tremuloides*), the latter being a successional species occurring as a result of fire or other disturbances.

The Engelmann spruce-alpine fir zone occurs above the white fir-douglas fir zone beginning at about 9,500 feet (2,896 m). On north-facing slopes this subalpine forest is composed primarily of Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) while on southern slopes, shrubs (including *Artemisia*) and grassy meadows are interspersed among stands of these trees.

2.1.6 Major Vegetation Types

The vegetation types of the region are defined as units of vegetation which are relatively widespread, recognizable and can be mapped due to their association with distinct soil types, topography and various environmental factors. The vegetation types are discussed in detail and have been abstracted from the M-X ETR 14 Vegetation Report (HDR, 1980a).

2.1.6.1 Alkali Sink Scrub

Alkali sink scrub vegetation is found at low elevations throughout the area, in valley bottoms, especially around playa margins, in saline or alkaline clay soils. This vegetation is composed of a very open growth of shrubs three feet or less in height and low herbs. The shrubs are green or gray-green, depending upon the species and season of the year. Flowering occurs in spring and is generally inconspicuous.

Alkali sink scrub is dominated by a limited number of halophytic shrubs and herbs. Greasewood (*Sarcobatus vermiculatus*) often forms pure or nearly pure stands. Iodine bush (*Allenrolfea occidentalis*) and saltgrass (*Distichlis spicata*) dominate areas too salty for greasewood; for example, they often form the inner fringe of vegetation around barren playas, or separate upland communities from salt marsh communities (Cronquist et al, 1972).

Current literature shows that dominant species of this vegetation type found within the area include:

Scientific Name	Common Name
Allenrolfea occidentalis	Iodine bush
Artemisia spinescens	Bud sage
Atriplex confertifolia	Shadscale
Atriplex lentiformis	Saltbush
Bassia hyssopifolia	Hyssop-leaved bassia
Distichlis spicata var. *stricta*	Saltgrass
Glaux maritima	Black saltwort
Halogeton glomeratus	Halogeton
Haplopappus lanceolatus	Intermountain pyrrocoma
Hutchinsia procumbens	Prostrate hutchinsia
Iva axillaris	Poverty weed
Juncus balticus var. *montanus*	Baltic rush
Kochia americana	Red sage, Red molly
Salicornia spp.	Pickleweed

Salsola iberica	Russian thistle
Sarcobatus vermiculatus	Greasewood
Sporobolus airoides	Alkali saccaton
Suaeda nigra	Black sea-blite
Thelypodium sagittatus	Sagittate thelypodium

Sources of present disturbance to this vegetation include use as grazing pasture and as off-road vehicle recreation areas. Successional characteristics and recovery potential are unknown.

2.1.6.2 Creosote Bush Scrub

Creosote bush scrub is a widespread shrub community of the Mojave and Sonoran deserts. The form of this type found in the Mojave Desert is sometimes referred to a Mojave Desert scrub. This vegetation is found in southern Nevada and in the southwest corner of Utah, in dry areas of low topographic relief, usually below 4,000 ft, although the dominant species, creosote bush, may occur in Nevada up to 5,200 ft (Beatley, 1976). This vegetation has been well-studied by Beatley at the U.S. Air Force Nevada Test Site and other areas in south-central Nevada (Beatley, 1976).

Creosote bush scrub is found on bajadas and other areas of gradual relief. Mean rainfall, measured over a ten-year period from 1962 through 1972 at several stations at the U.S. Air Force Nevada Test Site, was 4.7 to 6.2 inches, with annual variation in the general range of 2 to 13 inches. Mean maximum temperatures for all seasons were approximately 81 to 87 degrees F°, and mean minimums 29 to 40 F°, with extreme maximum 117 F°, and extreme minimum -8 F° (Beatley, 1976).

This vegetation is dominated by the creosote bush, _Larrea divaricata_, the most common shrub of these areas, and which usually occupies the upper layer of the two-layered shrub community. The size and density of this shrub vary with local moisture conditions, but it is the largest and most common shrub of this vegetation type. Total shrub cover varies from 7 to 23 percent, and average height from 0.2 to 0.9 m. Herbaceous perennials, grasses, and summer-

and winter-flowering annuals are abundantly represented in this vegetation (Beatley, 1976)

Field studies and literature show that dominant shrubs of this vegetation type within the area include:

Scientific Name	Common Name
Acamptopappus shockleyi	Shockley goldenhead
Ambrosia dumosa	Bursage
Atriplex confertifolia	Shadscale
Dalea fremontii	Indigo bush
Encelia farinosa	Brittle bush
Ephedra funerea	Ephedra
E. torryana	Torrey ephedra
Eurotia (Ceratoides) lanata	Winterfat
Grayia spinosa	Hopsage
Haplopappus cooperi	Goldenbush
Krameria parvifolia	Krameria
Larrea divaricata	Creosote bush
Lycium andersonii	Anderson's boxthorn
L. pallidum	Boxthorn
L. shockleyi	Shockley's boxthorn
Menodora spinescens	Spiny menodora
Opuntia spp.	Beavertail, cholla
Yucca brevifolia	Joshua tree
Y. schidigera	Mojave yucca

One distinctive association or subtype found within the creosote bush scrub vegetation is Joshua tree woodland, dominated by the arborescent monocot *Yucca brevifolia*. This association is found high on alluvial fans, in areas of well-drained soil that receive a little more rainfall than is typical of creosote bush scrub in general. The Joshua tree forms open groves, with an understory of shrubs, perennial and annual herbs and grasses. This species is also found with an understory of shadscale scrub or Great Basin sagebrush vegetation (Cronquist et al., 1972).

Blackbrush, or blackbush (Coleogyne ramosissima), is a low shrub that occurs in pure stands in a subtype that is transitional between creosote bush scrub and shadscale scrub (Cronquist, 1972; Beatley, 1976).

A major source of disturbance to this vegetation type at the present time is the use of off-road vehicles (ORVs). The biological effects of these vehicles in the Mojave Desert have been documented and include changes in physical soil characteristics, increased erosion, and loss of topsoil (Webb, 1978; Davidson, 1974: Wilshire et al., 1978), destruction of shrubs and other plants, decrease in seedling survival and a reduction in revegetation potential (Wilshire et al., 1978). Effects on wildlife have also been documented (Busack, 1974; Luckenbach, 1975).

2.1.6.3 Shadscale Scrub

Shadscale scrub, referred to as saltbush scrub by some authors, is a wide-ranging shrub community that is abundant in western Nevada and southwestern Utah (Cronquist et al., 1972; Billings, 1954). It may occur on valley bottoms or on rocky slopes. It is considered by some as an edaphic climax community and tolerates salty soils, but apparently thrives best in areas where the salt content of the soil is relatively low (Kearney et al., 1914). It is tolerant of low moisture regimes and is common in western Nevada valleys with annual precipitation from 3.5 to 7 in. (Cronquist et al., 1972). It is distinguished from Great Basin sagebrush by floristic, climatic and elevational characteristics (Billings, 1949).

Shadscale scrub is a shrub community dominated by low, widely spaced, micropyllous, spiny, gray-green shrubs. Cover is often around 10 percent, with much open ground (Barbour and Major, 1977). Some perennial and annual herbs and grasses occur between the shrubs, but these are less common than in creosote bush scrub, especially annual herbaceous species. Growth varies with annual precipitation and occurs mainly in late spring, as does peak flowering.

The most abundant species of this vegetation type is shadscale (Atriplex confertifolia). The common name of this species is derived from

the supposed similarity of its leaves to the scales of a shad. According to current literature and field studies, other important shrub species in this community include the following:

Scientific Name	Common Name
Artemisia spinescens	Bud sage
Atriplex canescens	Four-wing saltbush
A. confertifolia	Shadscale
A. gardneri	Gardner's saltbush
A. nuttallii	Nuttall's saltbush
Chrysothamnus viscidiflorus	Sticky-leaved rabbitbrush
Coleogyne ramosissima	Blackbrush
Ephedra nevadensis	Nevada ephedra
Eurotia (*Ceratoides*) *lanata*	Winterfat
Grayia spinosa	Hopsage
Gutierrezia sarothrae	Matchweed
Kochia americana	Red sage
Lycium spp.	Boxthorn species
Menodora spinescens	Spiny menodora
Sarcobatus baileyi	Bailey's greasewood
Tetradymia glabrata	Little-leaf horsebrush

At least two distinctive associations, or subtypes, occur within shadscale scrub vegetation. Blackbrush, or blackbush (*Coleogyne ramosissima*), often forms pure or nearly pure stands, and is considered by some to be transitional between shadscale scrub and creosote bush scrub (Billings, 1949; Beatley, 1976). It grows on non-saline, often sandy soils, commonly where annual precipitation is below 6 inches. It appears as a community of dense to open stands of dark, evergreen shrubs, often interspersed with James' galleta grass (*Hilaria jamesii*), according to Cronquist et al., (1972).

Winterfat (*Eurotia lanata*) often occurs in pure stands as a subtype of shadscale scrub. The whitish-gray herbage of the plants causes the winterfat areas to stand out among the darker shadscale shrubs. It was assumed for many years that winterfat grew in areas of low salt concentration and relatively high moisture, but Workman and West (1967) found too much variation for

it to be thought of as an indicator of these conditions (Cronquist et al., 1972).

Current sources of disturbance to shadscale scrub include grazing by domestic livestock and off-road vehicle activities. These disturbances result in a loss of vegetative cover and increased erosion.

The available information on shadscale community succession comes primarily from studies on the recovery of this community after intense grazing had occurred. Shadscale communities can increase in vegetative cover on playa fringes and low bajadas after severe grazing pressure (Stewart, Cottam and Hutchings, 1940). Grazing pressure on shadscale communities seems to cause an increase in the shadscale component (Holmgren and Hutchings, 1972), since shadscale is of relatively low palatability to livestock (Stewart et al., 1940). Heavy spring and summer grazing in some areas can completely eliminate stands of winterfat (Stevens et al., 1977), an important forage species in the shadscale community. In areas of intense disturbance from grazing, winterfat has been replaced by rabbitbrush, snakeweed and saltbush (Stevens et al., 1977).

2.1.6.4 Great Basin Sagebrush

Great Basin sagebrush occurs extensively throughout the central and northern parts of Nevada, on rocky mountainsides, broad valleys and low foot-hills from about 5,000 to 10,000 ft elevation. It is the climatic climax of Great Basin desert areas where annual precipitation usually exceeds 7 inches. It is best developed on deep, permeable, nonsaline soils of well-drained valleys and mountain bases, especially on alluvial fans (Cronquist et al., 1972). It is viewed as replacing shadscale scrub at higher elevations, where there is somewhat more moisture, and soils are not as saline or alkaline (Billings, 1954).

The aspect of the typical Great Basin sagebrush community is of fairly dense to open gray-green shrubs, usually three feet or less in height and often with a dense understory of bunchgrasses, especially in relatively undisturbed regions. Perennial herbs are scattered in the understory although not particularly common and the annual herbaceous flora is depauperate, with

the exception of a variety of introduced, mainly Eurasian, weeds. Ground cover within Great Basin sagebrush varies from about 15 to 40 percent (Cronquist et al., 1972).

The dominant shrub of this vegetation is referred to variously as big, tall, or Great Basin sagebrush (Artemisia tridentata). Several varieties of this species are recognized and other species of Artemisia may dominate the sagebrush community as well. Other important shrub species include rubber rabbitbrush (Chrysothamnus nauseosus), also distinguished by a number of varieties, and bitterbrush or antelope brush (Purshia tridentata), the most important forage species of the community (Nord, 1965).

Relatively undisturbed sagebrush has a dense understory of perennial bunch-grasses, including bluebunch wheatgrass (Agropyron spicatum), Sandberg bluegrass (Poa sandbergii) and Idaho fescue (Festuca idahoensis). According to current literature and field studies conducted, important shrubs of the Great Basin sagebrush community include:

Scientific Name	Common Name
Artemisia arbuscula	Dwarf sagebrush
A. nova	Black sagebrush
A. tridentata	Big sagebrush, Tall sagebrush, Great Basin sagebrush
Chrysothamnus greenei	Green's rabbitbrush
C. nauseosus	Rubber rabbitbrush
C. viscidiflorus	Sticky-leaved rabbitbrush
Coleogyne ramosissima	Blackbrush
Ephedra torreyana	Torrey ephedra
E. viridis	Morman tea
Grayia spinosa	Hopsage
Leptodactylon pungens	Granite gilia
Prunus andersonii	Desert peach
Purshia tridentata	Antelope brush, Bitterbrush, Deerbrush
Ribes velutinum	Plateau gooseberry

Symphoricarpos spp.	Snowberry species
Tetradymia glabrata	Little-leaved horsebrush

Important perennial grasses of the Great Basin sagebrush community include:

Scientific Name	Common Name
Agropyron dasystachyum	Thickspike wheatgrass
A. smithii	Western wheatgrass
A. spicatum	Bluebunch wheatgrass
Aristida purpurea	Purple three-awn
Bromus carinatus	California brome
Elymus cinereus	Basin wildrye
Festuca idahoensis	Idaho fescue
Koeleria cristata	Junegrass
Oryzopsis hymenoides	Indian mountain-rice
Poa fendleriana	Mutton grass
P. nevadensis	Nevada bluegrass
P. sandbergii	Sandberg bluegrass
Sitanion hystrix	Squirreltail
Sporobolus airoides	Alkali saccaton
Stipa comata	Needle-and-thread grass
Stipa spp.	Needlegrass species

Several important changes have occurred in the Great Basin sagebrush vegetation since about 1840. In central Utah, and probably elsewhere, this vegetation was co-dominated by bunchgrasses, a condition now represented by relictual, relatively inaccessible sites and areas where grazing has been excluded (Christensen and Johnson, 1964; Cottam, 1961). In other areas, sagebrush is more vigorous, and when undisturbed, tends to outcompete the grasses (Pearson, 1965; Robertson, 1947). Climatic differences may be an important factor in determining whether sagebrush or sagebrush-bunchgrass will dominate in a given area. By comparing climatic and phytosociological data in Utah, Christensen (1959) found that areas that received more rainfall had more bunchgrass than sagebrush. The season of precipitation may be important, since winter-maximum areas are dominated by sagebrush, and summer-maximum

areas by sagebrush-bunchgrass.

Great Basin sagebrush areas have been used for grazing and farming activities. Much of the farmland of the area is cleared sagebrush, and many urban areas were previously vegetated with this type (Cronquist et al., 1972).

Great Basin sagebrush is not a good browse plant because its herbage contains essential oils that inhibit microbial action in ruminants (Nagy et al., 1964), although native herbivores (mule deer, pronghorn and desert bighorn) sometimes graze it, especially that which grows in areas of high water potential (Young et al., 1975). Several management techniques have been used to decrease the amount of sagebrush and increase the amount of palatable grasses, in grazed areas. Discing and defoliation are the procedures most commonly used. In disced areas, the sagebrush is physically uprooted or crushed by a discing or mowing machine, and the area is later planted with a forage grass, commonly crested wheatgrass (*Agropyron cristatum*). Defoliation is carried out by spraying the sagebrush with a commercial brand of dicot herbicide, usually consisting of a mixture of 2,4-D and 2,4,5-T. Defoliation kills the shrubs, but it does not physically remove them. Grasses are planted later and grow thickly between the dead sagebrush. Crested wheatgrass is commonly also used in this method.

Sources of present disturbance to the sagebrush vegetation include overgrazing by cattle and sheep, discing and defoliant spraying, strip mining operations, development of urban areas and effects of off-road vehicles and other forms of recreation.

The successional characteristics of the Great Basin sagebrush community have apparently changed as a result of modifications due to grazing. In the pristine condition, recovery of the Great Basin sagebrush community after disturbance involved an initial domination by either climax perennial grasses, or root-sprouting shrubs with shortlived perennial grasses (e.g., squirreltail grass, (*Sitanion histrix*) and Sandberg bluegrass, (*Poa sandbergii*)). Later, sagebrush with climax perennial grasses became established and dominated the area. Following disturbance from fire, Great Basin sagebrush does not resprout from root crowns but species of *Chrysothamnus*, *Prunus*, *Ribes*, *Tetradymia* and

some Purshia do sprout. These resprouting species dominate burned areas for up to 20 years after the occurrence of fire (Young and Evans, 1974). In communities where a high density of alien annual grasses, such as cheatgrass (Bromus tectorum), has become established, the reestablishment of sagebrush is inhibited due to frequently recurring fires (Young and Evans, 1978).

Robertson et al (1966) in a field of study located in the eastern foothills of the Santa Rosa mountains in north-central Nevada, found that Great Basin sagebrush reinvaded grubbed areas if the competition from seeded grasses was low. Brush reinvasion into 9-ft cleared strips was more rapid than reinvasion into 1 acre cleared plots. The percent cover of sagebrush in areas cleared 17 years ago was found to range from 0- to 26.5, depending upon amount of competition from grass species.

In a study reported by Young and Evans (1973), the brush overstory, which was dominated by Great Basin sagebrush, was cleared by hand and the recovery of the vegetation was monitored. Alien annual herbs, including Russian thistle, were the initial dominants on sites where a seed source for these species was available. Dominance by downy brome was seeded, relatively dense populations excluded perennial grass seedlings. Sagebrush reestablishment, which was thought to result from a large number of seeds in the soil, was not inhibited by dense growth of downy brome.

Jaynes and Harper (1978) examined the vegetation which colonized 21 study sites along roadways through shadscale-grass, blackbrush, sagebrush and grassland-shrub communities. The most successful recolonizers of the upper benchlands, which have sandy loam soils, were Indian mountain-rice, James' galleta grass, broom snakeweed and native annual herbs. On the lower benchlands which have sandy clay loam soils, shadscale shrubs, desert molly and other native annuals were found to be successful recolonizers of the roadsides. These studies on Great Basin sagebrush community succession suggest that recovery of this vegetation type to predisturbance density, diversity and productivity levels could take a minimum of several decades.

In sagebrush communities, grazing has reduced or eliminated the perennial grasses, and changed the shrub composition in many ways. Shrubs

that are least preferred for grazing, including the dominant species of Artemisia, have increased in dominance, while preferred forage species have become less common.

2.1.6.5 Pinyon-Juniper Woodland

Pinyon-juniper woodland is widespread in the central and northern parts of Nevada, in mountainous terrain, and on high plateaus between 5,000 and 8,000 ft. This type of forest vegetation occupies more area in the region than all other forest types combined. The lower elevation limits of its range are determined by amount of precipitation. It generally does not occur in areas that receive less than 12 in. of precipitation annually (Cronquist et al, 1972). The areas in which it occurs receive between 12 and 18 in. of precipitation annually, mostly as snow in winter.

Pinyon-juniper woodland is a community of small evergreen trees, rarely exceeding 20-30 ft in height and spaced widely enough that the canopies of the trees usually do not touch. There is a moderate to very dense understory of medium-sized shrubs, composed mainly of species characteristic of the Great Basin sagebrush community, especially Great Basin or big sagebrush (Artemisia tridentata). The understory also contains many perennial herbs and grasses, and a limited number of annual herbs and grasses (Cronquist et al., 1972). This vegetation has been called a pygmy forest by various authors (Cottam, 1929; Tanner and Hayward, 1934; Rasmussen, 1941; Woodbury, 1947), but should not be confused with the pygmy forests of the eastern and western coastal regions, which are dominated by conifers stunted as a result of growth in hardpan or saturated soils (Raven, 1977).

The dominant species of this vegetation vary locally with characteristics of topography, elevation and geographic location. At the lowest elevations, junipers usually dominate alone, often forming extensive juniper woodlands with Great Basin sagebrush understory. At higher elevations, with slightly higher precipitation, pinyons and junipers are intermixed. Some areas, often at the upper elevational limits, are dominated solely by pinyons, although this type of association covers less area than the juniper community (Cronquist et al., 1972).

The shrub layer of the pinyon-juniper woodland commonly contains the following species:

Scientific Name	Common Name
Acer glabrum	Mountain maple
Amelanchier alnifolia	Service-berry
Artemisia arbuscula	Dwarf sagebrush
A. nova	Black sagebrush
A. tridentata	Great Basin sagebrush
Ceanothus velutinus	Tobacco brush
Cercocarpus ledifolius	Narrow-leaved mountain mahogany
Chrysothamnus nauseosus	Rubber rabbitbrush
C. viscidiflorus	Sticky-leaved rabbitbrush
Cowania mexicana var. stansburiana	Cliff rose
Ephedra viridis	Mormon tea
Gutierrezia sarothrae	Matchweed
Holodiscus dumosus	Bitterbrush
Quercus gambelii	Rocky mountain oak
Ribes cereum	Squaw currant
R. velutinum	Gooseberry
Sambucus racemosa	Elderberry
Symphoricarpos oreophilus	Mountain snowberry
Tetradymia canescens	Spineless horsebrush

Common grasses and herbs of this community include:

Scientific Name	Common Name
Achillea millefolium var. lanulosa	Yarrow milfoil
Agropyron smithii	Western wheatgrass
A. spicatum	Bluebunch wheatgrass
Astragalus spp.	Locoweed, rattlepod, milkvetch species
Balsamorhiza sagittata	Arrow-leaved balsamroot
Bouteloua gracilis	Blue grama
Chrysopsis villosa	Hairy golden-aster

Erigeron spp.	Fleabane species
Erigonum heracleoides	Parsnip-flowered wild buckwheat
E. microthecum	Great Basin buckwheat brush
E. umbellatum	Sulphur buckwheat
Eriophyllum lanatum	Common woolly-sunflower
Festuca idahoensis	Idaho fescue
Frasera albomarginata	Desert frasera
Grindelia squarrosa	Resin-weed
Hymenoxys richardsonii	Hymenoxys
Ipomopsis aggregata	Scarlet gilia
Koeleria cristata	Junegrass
Leucopoa kingii	Spikegrass
Lithospermum ruderale	Columbia puccoon
Lupinus sericeus	Silky lupine
Oryzopsis hymenoides	Indian mountain-rice
Penstemon eatonii	Eaton's firecracker
P. speciosus	Showy penstemon
P. watsonii	Watson's penstemon
Poa fendleriana	Mutton grass
P. sandbergii	Sandberg bluegrass
Sitanion hystrix	Squirreltail
Sporobolus cryptandrus	Sand dropseed
Stipa columbiana	Columbia needlegrass
S. comata	Needle-and-thread grass
S. thurberiana	Thurber needlegrass

The economic importance of this community is limited, but fairly diverse. The wood of pinyons and junipers is not abundant enough, nor of the quality required, for large-scale commercial timber operations. However, this wood is used for fence posts and firewood. Permits are issued near Christmas time by the BLM for harvesting of juniper "Christmas trees" (Hunt and Bishop, 1966). Pinyon pines produce edible pine nuts that are commercially harvested in some areas, often by Native American tribes that traditionally used them as a major food source. The single-leaved pinyon (*Pinus monophylla*)

is recognized in the Nevada Revised Statutes (527.240) as the official state tree; mechanically harvesting these nuts in Nevada is prohibited (NRS 527.250). Pinyon-juniper woodlands support deer, pronghorn antelope and several species of game birds which are hunted, thus providing revenue through the sale of licenses issued by the state. Agriculture is not practiced in this community, but grazing is fairly widespread (Clary, 1975; Springfield, 1975). In many areas, especially on plateaus and high bajadas, the junipers are removed by chaining or defoliant spraying to increase the growth of more palatable shrubs and grasses. In some cases, seeding with creasted wheatgrass (Agropyron spicatum) has been used to increase grazing capacity.

Sources of present disturbance to this community include activities associated with grazing, including chaining and defoliant spraying, and vegetation removal resulting from mining and processing operations. Off-road vehicle scars may be noted in some areas, but this is not yet a major source of disturbance in this community. Natural and man-caused fires are of frequent occurrence.

Limited information is available on the nature of succession in the pinyon-juniper woodland community (West et al., 1975). Under pristine conditions fires were fairly frequent and secondary succession involving sagebrush establishment followed by pinyon and juniper reestablishment occurred relatively often (Barney and Freschknecht, 1974). The invasion of sagebrush communities by pinyons and junipers in recent times has been investigated by several authors (Blackburn and Tueller, 1970; Burkhardt and Tisdale, 1969; Tausch et al., 1980). In east-central Nevada, junipers and, later, pinyons invade black sagebrush (Artemisia nova) communities until the understory is almost completely eliminated. Accelerated invasion by pinyon and juniper began in about 1921 and is related to overgrazing, fire suppression and climatic change (Blackburn and Tueller, 1970). Similar patterns of tree establishment and understory suppression, beginning as early as the 1870's, have been observed in many areas of the Great Basin (Tausch et al., 1980).

2.1.6.6 Unique Vegetation

The vegetation types described above are generally common and widespread in the Great Basin. Some vegetative features are not actually rare or threatened, nor are they common or widespread enough to be considered under general vegetation types. These features are often defined as unique vegetation; they are atypical, unusual or in some way unique. Examples are as follows:

1. Range extensions: Areas where a certain species reaches the limit of its range or occurs as a disjunct population. For example, regions where the Joshua tree reaches the northernmost extent of its geographic distribution.

2. Relict populations: Areas in the Great Basin, usually at high elevations, where a certain species or group has remained unaltered for long periods of time. They are the remaining populations of plant species whose distributions were once more widespread. Boreal forests consisting of ponderosa pine (Pinus ponderosa) and bristlecone pine (*Pinus longaeva*) are examples.

3. Unusual ecotypes: Areas where, for unknown reasons, plants occur in a habitat that is radically different from the normal habitat associated with that plant. For example, an occurrence of Rocky Mountain juniper (*Juniperus scopulorum*) in a low marshy zone.

4. Hybridization zones: Areas where biological species are intergrading and undergoing "explosive evolution" (experiencing rapid rates of change). These areas are considered unique if they are currently being studied or have been clearly identified.

5. Aquatic or wetland vegetation: Areas where riparian, marsh, or distinctive spring vegetation is known to occur. These areas are not common in the Great Basin and are considered unique only if verified by field data or if documented in the literature.

6. Bald Mountains: Mountains or peaks which contain a sagebrush-grass zone at the summit above the pinyon-juniper zone. In these areas it appears that pinyon-juniper vegetation is superimposed upon a large sagebrush-grass zone which has wide elevational tolerances (Billings, 1951).

7. Joshua tree zones: Areas in which Joshua tree (Yucca brevifolia) is known to occur. The limited distribution of this plant association includes the southern part of Nevada as the northernmost populations of the Joshua tree.

8. Alpine or sub-alpine vegetation: Treeless areas at high elevations; known only from a few mountain ranges such as the Deep Creek and Snake ranges.

9. Sand dune vegetation: Species that occur here are often substantially different from those of the surrounding community. (Stutz et al., 1975).

Table 2-1 lists valleys in Eureka County which contain unique vegetation features.

2.1.6.7 Timber Resources

Nevada's total forest land amounts to 7.7 million acres. Only 129,000 acres of this total is estimated as commercial timberland. None of the counties from which timber production is reported are within the Mt. Hope area and adjacent regions.

2.1.6.8 Alien Annual Species

Plant communities in the Great Basin are susceptible to invasion by alien annual species, as stated by Young, et al. (1972) and Piemeisel (1951). These annuals have extremely well developed breeding systems which permit rapid adaptation to changing environments. The change in environment is brought about by a disturbance, commonly heavy grazing, which will sufficiently alter the environment so as to promote an abundance of alien annuals. Many

Table 2-1 Unique Vegetation Features of Eureka County, Nevada

Hydrologic Subunit		Region Name	Unique or Unusual Occurrence
53	Pine	Roberts Mountains	"Unusually" lush vegetation - bristlecone pine
54	Crescent	Beowawe Geysers	Sinter terrace colonized by *Poa nevadensis* (Nevada bluegrass)
60	Whirlwind	Beowawe Geysers	Riparian vegetation
139	Kobeh	Roberts Mountains	Bristlecone pine
153	Diamond	Roberts Mountains	Boreal forest 1/ - limber pine (*Pinus flexilis*)

1/ Boreal forests include: Bristlecone pine (*Pinus longaeva*), ponderosa pine (*Pinus ponderosa*).

Source: Data abstracted from M-X ETR 14 Vegetation (HDR, 1980a)

of the invasionary species are not palatable to livestock.

A prevalent example is Halogeton glomeratus, a Central Asian weed that is toxic to livestock (Cronquist et al., 1972). It quickly invades the shadscale scrub vegetation type after disturbance. Under conditions of light disturbance, halogeton is gradually replaced by rabbitbrush, winterfat or shadscale. Under more severe or repeated disturbance, halogeton can alter the soil chemistry to the point that native vegetation is excluded (Cook and Stoddart, 1953). Site modification by halogeton may prevent native species reestablishment for over 50 years (Eckert and Kinsinger, 1960). Halogeton has reduced or eliminated grazing in many areas since it is toxic to livestock (Cook and Stoddart, 1953). Recent studies suggest that the only effective method for control of halogeton is by competition with perennial species (Cleaves and Taylor, 1979). Halogeton may also invade the alkali sink scrub vegetation type since it establishes and rapidly spreads in area of alkaline soil that have been disturbed.

Grazing is common within the sagebrush vegetation type and has brought about a number of widespread changes. In many grazed areas, the preferred perennial bunchgrasses have been nearly eliminated by overgrazing. In some areas, this has encouraged the encroachment of sagebrush, and in others the annual cheatgrass, or downy brome (Bromus tectorum), has become exceptionally widespread. This annual is not as palatable to livestock as the perennial grasses and is not reliable forage, since its abundance is largely determined by annual rainfall (Hansen, 1979). Introduced annuals such as Russian thistle (Salsola iberica), tumbling mustard (Sisymbrium altissimum) and cheatgrass (Bromus tectorum) are now so widespread and form such a complete understory in many degraded communities, that reestablishment of native perennial grasses is often precluded (Young and Evans, 1973) and fire behavior and secondary succession altered (Young et al., 1976; Young and Evans, 1978). Without additional disturbance, Russian thistle will be gradually replaced by sagebrush on many of these higher elevation sites (Holmgren and Hutchings, 1972).

Similar patterns have resulted from past overgrazing of the other vegetation communities, another example being the shadscale scrub.

On the coarse substrates of the bajadas, a disturbance can result in the establishment of Russian thistle (Salsola iberica) which may dominate the site for up to 15 years or more (Stewart et al., 1940). If disturbance is not severe or repeated, Russian thistle will gradually give way to a cover of tumble mustard (Sisymbrium altissimum) to be replaced by tansy mustard (Descurainia spp.) and eventually by cheatgrass, or downy brome (Bromus tectorum) (Piemeisel, 1932, 1938). Under conditions of continued disturbance, this successional sequence will revert back to Russian thistle dominance (Evans et al., 1967).

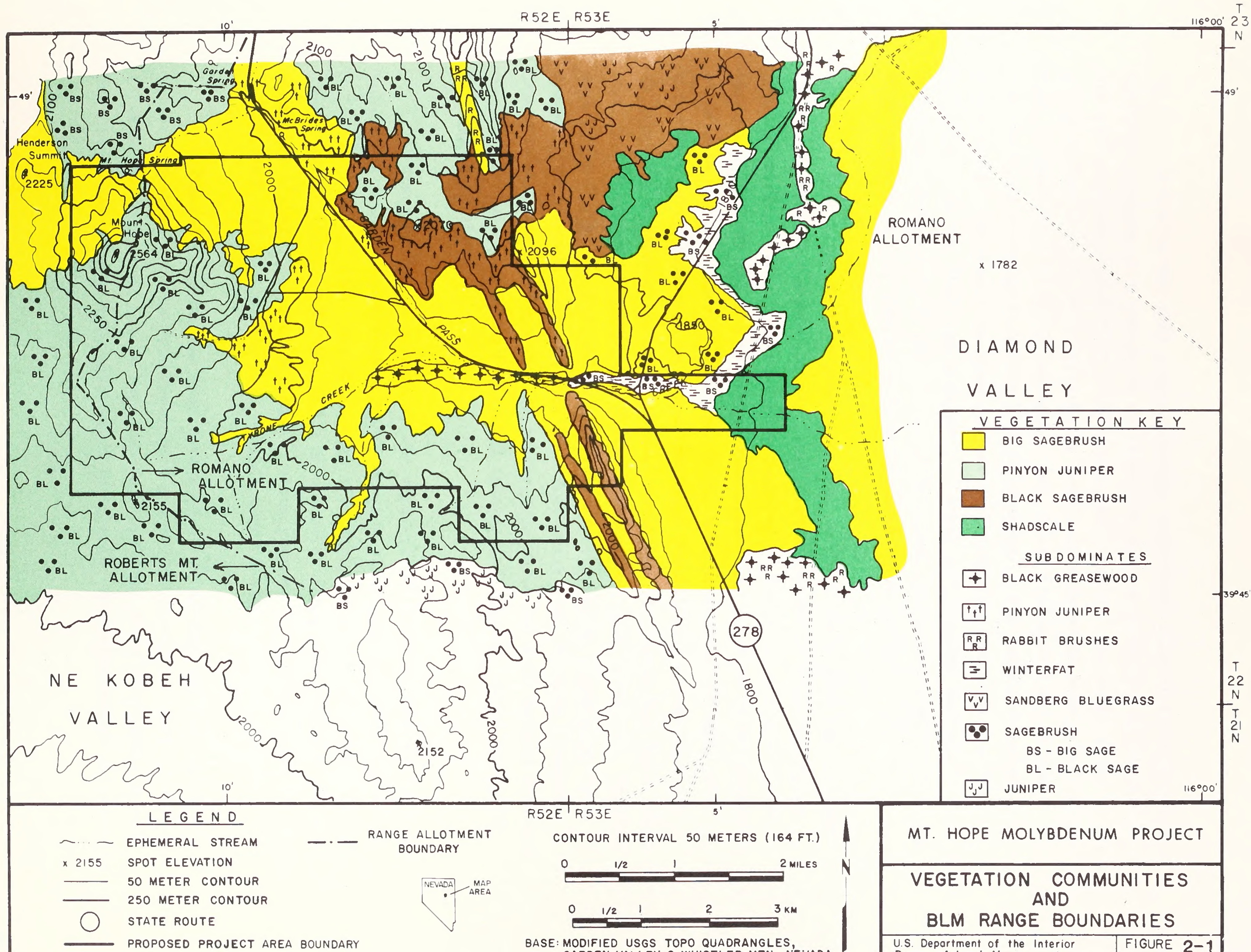
2.1.7 Vegetation of Mt. Hope/Proposed Action Area

Two major vegetational community types are encountered in the Mt. Hope area: (1) the Sagebrush Zone of the basin floors and ridge bajadas; and, (2) the Pinyon-Juniper Zone of the higher elevations. Sites with alkaline soils are vegetationally similar to the Shadscale Zone, although elevation of occurrence exceeds that delimited in characterizations by Billings (1951).

Percent cover, forage value and component plant species in the Sagebrush Zone are highly variable depending on precipitation, soil types, level of disturbance and grazing pressure.

The Pinyon-Juniper Woodland Zone is generally represented by a plant community of small evergreen trees, rarely exceeding an individual height of 15 ft (4.5 m) in the project area, substantial understory is present in the form of shrubs and grasses extending from the Sagebrush Zone.

The dominant species of the vegetative communities in the project area (Figure 2-1) include singleleaf, or one-needle pinyon (Pinus monophylla), western juniper (Juniperus occidentalus), black sagebrush (Artemisia arbuscula nova), big sagebrush (A. tridentata), and shadscale (Atriplex confertifolia). Secondary and codominant species include rubber rabbitbrush (Chrysothamnus nauseosus), Douglas rabbitbrush (C. viscidiflorus), Sandberg bluegrass (Poa sandbergii), crested wheatgrass (Agropyron cristatum) and black greasewood (Sarcobatus vermiculatus) (U.S.D.I,, 1983a).



MT. HOPE MOLYBDENUM PROJECT

VEGETATION COMMUNITIES AND BLM RANGE BOUNDARIES

FIGURE 2-1

Based on WRC 1983 survey results, understory composition was quite variable; perhaps as a result of differential grazing pressures by livestock and soil textural variability. The pinyon pine-juniper-sagebrush zones contained areas which were essentially devoid of understory vegetation; areas with an understory of black sagebrush; and, areas with a mixture of black sagebrush and sandberg bluegrass (*Poa sandbergii*). Big sagebrush occurred sporadically throughout the pine-juniper-low/black sagebrush zone, on what appeared to be the finer textured soils. Areas which lacked understory vegetation appeared to be characterized by loose, coarse textured xeric soils. Soil textures for the remaining areas appeared to be "finer".

The survey results continued that in the project area the big sagebrush type usually occurred at the lower elevations and on level to gently rolling terrain. This type generally occurred on the finer textured soils. Understory composition was variable; also apparently a result of differential grazing by cattle. Heavily utilized areas, such as those which were near water were often dominated by annual mustards (Cruciferae). Less heavily utilized areas usually contained greater converage of grasses and fewer weedy annuals. Sandberg bluegrass was the most ubiquitous grass observed. Needle-and-thread (*Stipa comata*) and Indian ricegrass (*Oryzopsis hymenoides*) were frequently observed, although much less frequently than Sandberg bluegrass. The big sagebrush type appeared to be the type which was most heavily utilized by cattle. Table 2-2 lists the floral species individually noted during the WRC survey of 1983.

Distribution by acreage of the vegetational types within the project boundaries equals: 4,477.6 of pinyon juniper - black sage (45.33%); 3759.1 of big sage (38.05%); 733.1 for black sage - pinyon juniper (7.42%); 333.6 of big sage - pinyon juniper (3.38%); 163.0 of winterfat - big sage (1.65%); 156.9 of shadscale (1.59%); 126.5 of big sage - black greasewood (1.28%); 116.5 of black sage (1.18%) and 11.6 of big sage - black sage (0.18%).

Vegetation cover has been estimated at 30 percent for the two major types: sagebrush and juniper-pinyon with grass understories. Characteristically, percent cover can be expected to range from 15 to 40 percent in all but the shadscale-type community which may exhibit near-zero covers in strongly

Table 2-2 List of Flora Specifically Observed in the Mt. Hope Area

Common Name	Binomial
Grasses	
Western wheatgrass	Agropyron smithii
Smooth brome	Bromus inermis
Cheatgrass	Bromus tectorum
Basin Wildrye	Elymus cinereus
Indian ricegrass	Oryzopsis hymenoides
Sandberg bluegrass	Poa sandbergii
Bottlebrush squirreltail	Sitanion hystrix
Needle and thread	Stipa comata
Thurbers needlegrass	Stipa thurberiana
Forbs	
Arrowleaf balsamroot	Balsamorhiza sagittata
Andersons larkspur	Delphinium andersonii
Curlycup gumweed	Grindelia squarrosa
Halogeton	Halogeton glomeratus
Clasping pepperweed	Lepidium perfoliatum
Lupine	Lupinus spp.
Yellow sweetclover	Melilotus officinalis
Penstemon	Penstemon spp.
Hoods phlox	Phlox hoodii
Gooseberry leaved globemallow	Sphaeralcea grossulariifolia
Shrubs, Trees and Succulents	
Low sagebrush/black sagebrush	Artemisia arbuscula/nova
Big sagebrush	Artemisia tridentata
Shadscale	Atriplex confertifolia
Winterfat	Ceratoides lunata
Curlleaf mountain mahogany	Cercocarpus ledifolius
Birchleaf mountain mahogany	Cercocarpus montana
Rubber rabbitbrush	Chrysothamnus nauseosus
Blackbrush	Coleogyne ramosissimd
Mormon tea	Ephedra spp.
Utah juniper	Juniperus osteosperma
Brittle pricklypear	Opuntia fragilis
Pricklypear	Opuntia polyacantha
Singleleaf pinyon pine	Pinus monophylla

alkaline areas.

The existing characteristics of the Mt. Hope area vegetation generally limit forage value. Use as rangeland, presently for cattle grazing, is apparently limited by the presence of variable soil types and associated percent cover, limited water availability and uncontrolled grazing by wild horses. Generally unpalatable or poisonous species (shadscale, rabbitbrush, halogeton) may additionally limit area forage value if present. Areas of substantial grazing value appear to be limited to localized areas of wheatgrass, winterfat and spring/well-associated vegetation. Carrying capacity of the proposed project area is highly variable and estimated to average 11 to 20 acres per animal unit (AUM).

The proposed tailings site (4-A) is composed of the followiong communities: big sagebrush, pinyon juniper-black sagebrush, black sagebrush-pinyon juniper and big sagebrush-black greasewood (Figure 2-1). The big sagebrush community is predominant.

Alternative tailing pond Site 4-B has a vegetation cover of big sagebrush. Alternative tailing pond Site 4-C has a vegetation cover of big sagebrush-juniper at higher elevations and big sage at lower elevations.

The proposed mine pit area (7-A) is mostly pinyon juniper-black sagebrush with minor communities of big sagebrush-pinyon juniper and big sagebrush.

The northern non-mineralized storage area (8-A) consists of big sagebrush (predominantly), pinyon juniper-black sagebrush, big sagebrush-pinyon juniper and a limited area of mountain mahogany.

The southern non-mineralized storage area (8-B) is almost entirely pinyon juniper-black sagebrush with a minor community of big sagebrush.

The proposed access road within the land boundary traverses big sagebrush (predominant) and big sagebrush-pinyon juniper communities.

The proposed relocation of State Route 278 (6-A) would traverse the following communities: big sagebrush, big sagebrush-pinyon juniper, black sagebrush-pinyon juniper, pinyon juniper-black sagebrush, shadscale, big sagebrush-black sagebrush and winterfat-big sagebrush.

Proposed power line route (2-A) also has a predominant vegetation cover of big sage. Other communities are black greasewood-big sage, pinyon juniper, black sage, big sage-juniper, winterfat-big sage and pinyon juniper-big sage.

Alternative route (2-B) also traverses several vegetation communities with big sagebrush predominating. Other communities are black sage-pinyon juniper, shadscale, winterfat-big sage and pinyon juniper-big sage.

Alternative route (2-C) for the power line traverses several vegetation communities, of which big sagebrush predominates. Other communities include black sage, winterfat-big sage, shadscale, black greasewood-rabbit brush and pinyon juniper-big sage.

The proposed routing for the Kobeh Valley water line right-of-way (3-A) and alternative water line corridor (3-B) traverse three dominant vegetation communities: big sagebrush, juniper-big sagebrush and black sagebrush-big sagebrush. The big sagebrush community is predominant. Alternative water line corridor (3-C) traverses big sagebrush, pinyon juniper-black sagebrush and crested wheatgrass.

2.1.8 Forage Values of Mt. Hope/Proposed Action Area

Vegetational importance in the Great Basin Region is often established, for functional and utilization purposes, by the determination of carrying capacity, most frequently by the measurement factor of AUMs (animal unit months), allows a broad perspective of overall community productivity and habitat or use value. An AUM is defined as the amount of forage required by one cow or its equivalent for one month of sustenance. Vegetational areas may be categorized as to cattle, sheep, wild horse, etc. AUM values (e.g., one AUM for cattle, or 5 sheep AUMs or 4 deer AUM, etc.).

To allow a level of productivity characterization of the Mt. Hope vegetational environment, a review of AUM grazing capacity was conducted. Technical Report No. 8 (Land Use, Transportation and Noise) details the existing grazing use within the areas potentially affected by the proposed action and/or alternatives. Discussion of AUM values in this Technical Report is limited to representation of productivity via forage value quantification conducted by the BLM, in order that the significance of vegetational losses anticipated by implementation of the proposed action or alternatives could be determined. The following details the characterization of forage value at Mt. Hope via AUM quantification.

Rangeland is extensive throughout the Mt. Hope region. Numerical establishment of AUMs available were based on an occular range survey in 1964. The actual number of AUMs available will flucuate on a yearly basis due to climate variations.

The Mt. Hope region includes portions of two separate planning units: the Devils Gate Planning Unit which includes the Romano allotment and the Pony Express Planning Unit which includes the Roberts Mountain allotment.

The Romano allotment, includes a total of 3,034-3,708 AUMs in an area of 67,450 acres. The Roberts Mountain allotment includes a total of 18,444-22,542 AUMs in an area of 227,000 acres. Allotment boundaries within the Mt. Hope region are illustrated on Figure 2-1. The AUMs available for grazing within the Mt. Hope site are 358-438. Approximately 87 percent (311-381) exist within the Romano allotment, and 13 percent (47-57) exist within the Roberts Mountain allotment. Table 2-3 details the individual component areas and respective AUM value assignments. Figure 2-2 illustrates the individual AUM area boundaries relative to location and extent with the proposed land acquisition boundary.

2.2 Fauna

East-central Nevada has an array of fauna, reflecting the habitat types of forests, woodlands and scrublands associated with the rather continuous alternating basins and high mountain ranges. The faunal populations

Table 2-3 Calculation of Forage Values in the Mt. Hope Area

Survey Code 1/	Vegetation Type	Acres Per AUM 2/	Mt. Hope Acres	Total AUMs
JM-7	Winterfat - Big sagebrush	7	139	20
JM-2	Shadscale	19	147.4	8
JM-6	Big sagebrush - black sagebrush	43	45.7	1
JM-9	Big sagebrush	5	159.4	32
JM-23	Black sagebrush - Big sagebrush - Sandberg bluegrass	18	73.6	4
JM-1	Big sagebrush	27	249.8	9
JM-55	Black sagebrush	0	81.5	0
JM-52	Big sagebrush	27	140.5	5
JM-13	Black sage - Pinyon Juniper	13	244.5	19
JM-14	Black sage - Pinyon Juniper	18	388.8	22
JM-15	Big sagebrush - black greasewood	32	154.1	5
JM-20	Big sagebrush	25	2,515.1	101
JM-19	Big sagebrush - Pinyon Juniper	25	115	5
JM-21	Pinyon Juniper - Black sage	37	4,263.4	115
JM-22	Black sagebrush	23	151.6	7
GB-30	Big sagebrush - Pinyon	13	315.2	24
GB-33	Big sagebrush	30	383.9	13
GB-15	Big sagebrush - Juniper	30	243	8
			Total	398
			(Range 358-438)	

AUMs by Action Location

Tailings Pond 4-A

JM-20	84.0 AUMs
JM-23	1.11 AUMs
JM-21	18.63 AUMs
JM-14	22.55 AUMs
JM-15	6.27 AUMs
GB-30	3.23 AUMs
JM-22	1.08 AUMs

(Total 136.87, Range 123-150)

Plant Site 9-A

GB-30	7.69 AUMs

(Total 7.69, Range 6-8)

Mine Pit 7-A

JM-21	18.18 AUMs
GB-30	1.36 AUMs
JM-20	0.17 AUMs

(Total 19.71, Range 17-21)

Non-Mineralized Storage Area (South)

JM-20	1.86 AUMs
JM-21	43.25 AUMs

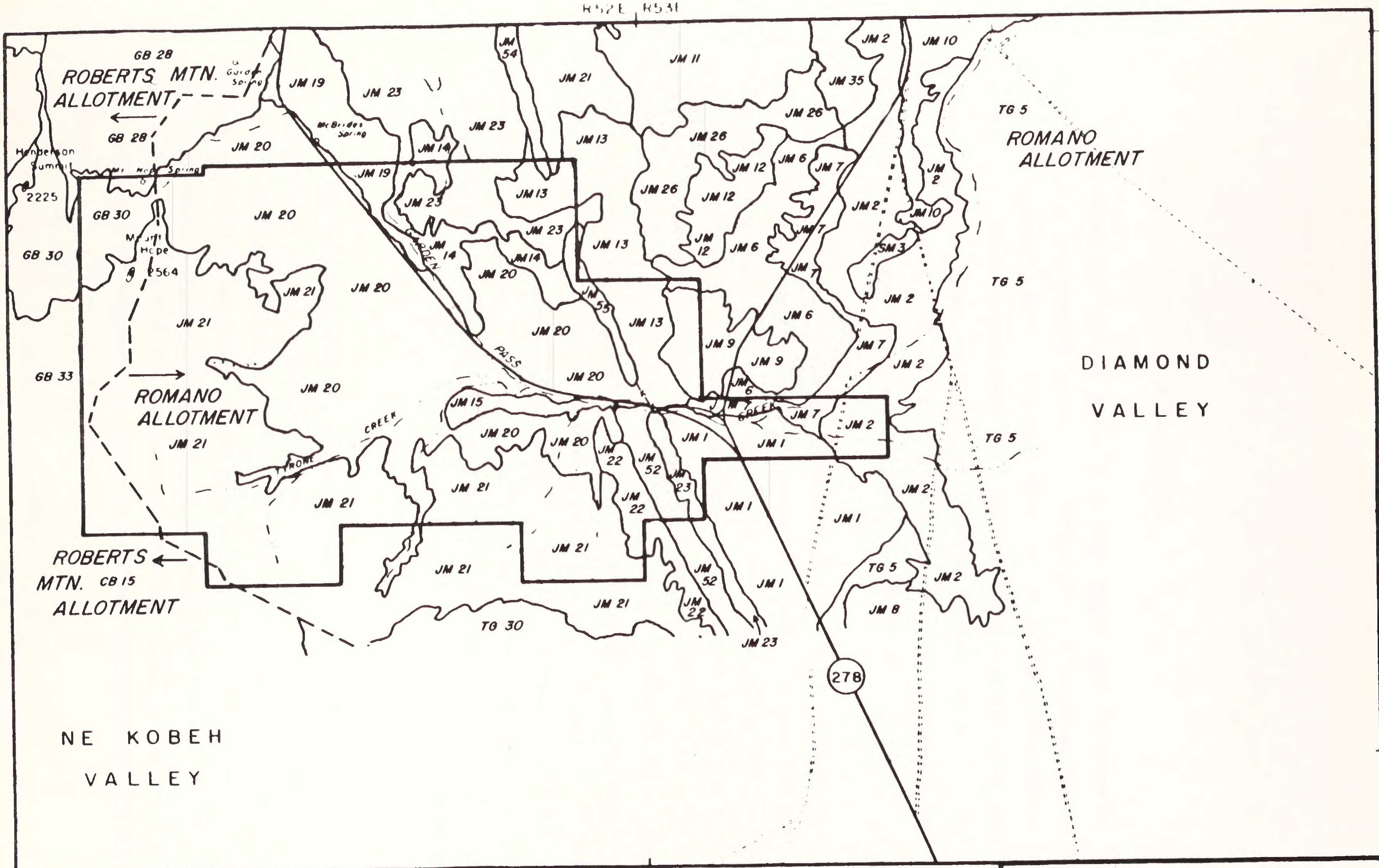
(Total 45.11, Range 40-50)

Non-Mineralized Storage Area (North)

JM-20	36.16 AUMs
JM-21	4.48 AUMs
GB-30	2.14 AUMs

(Total 42.78, Range 38-47)

1/ See Figure 2-2 for area delineation.
2/ Variable, dependent on climate, soils, etc., the Acres per AUM value are generally expected to range within 10 percent plus or minus as a total.



LEGEND

- EPHEMERAL STREAM
- 2155 SPOT ELEVATION
- RANGE ALLOTMENT BOUNDARY
- STATE ROUTE
- PROPOSED PROJECT BOUNDARY

NEVADA MAP AREA

R52E R53E

CONTOUR INTERVAL 50 METERS (164 FT)

0 1/2 1 2 MILES

0 1/2 1 2 3 KM

N

BASE: MODIFIED USGS TOPO QUADRANGLES, GARDEN VALLEY & WHISTLER MTN., NEVADA

MT. HOPE MOLYBDENUM PROJECT

BOUNDARY MAP OF AUM VEGETATIONAL AREAS

U.S. Department of the Interior
Bureau of Land Management

FIGURE 2-2

will be discussed in two major divisions: species which are relatively common and those which are threatened and endangered. The threatened and endangered species will be discussed later in a separate section.

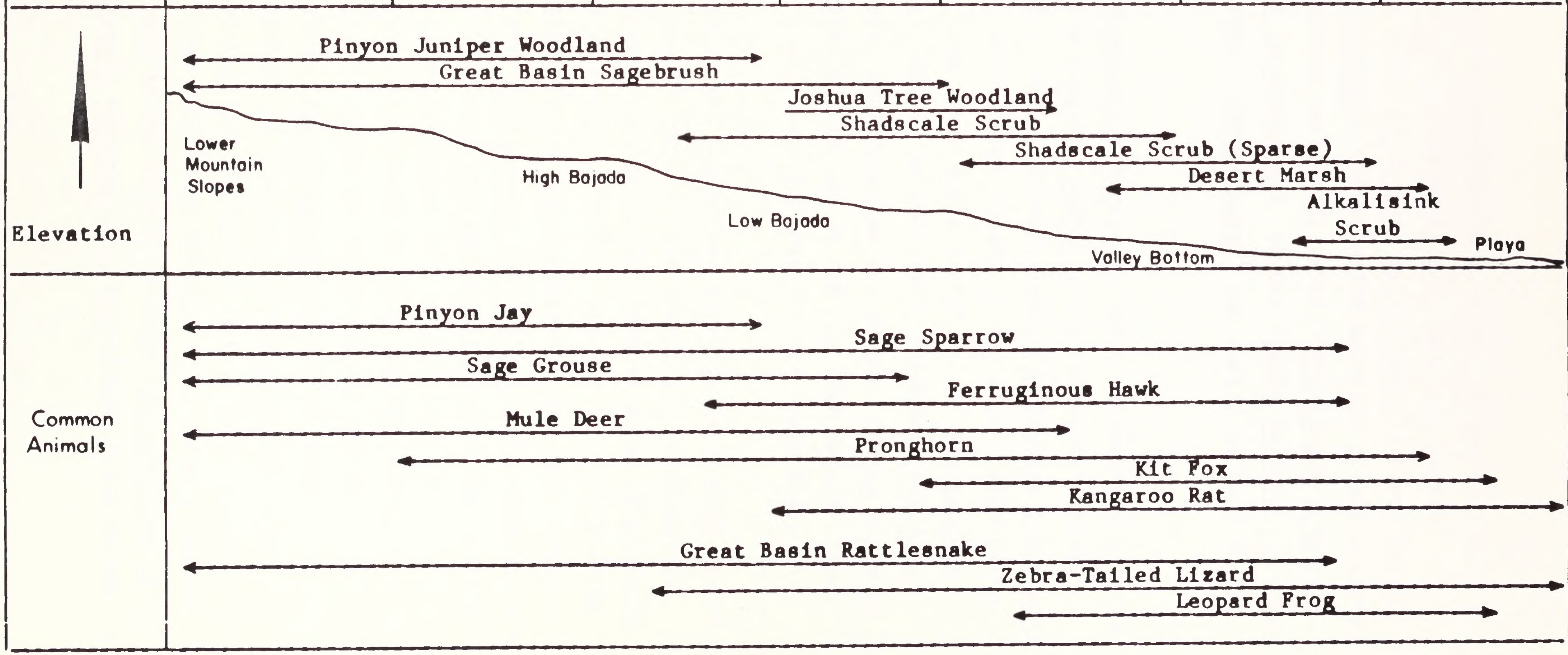
2.2.1 Common and Typical Faunal Species

Common and typical species of the region include mammals, birds, reptiles, fish and amphibians as representatively documented by the Bureau of Land Management, Battle Mountain District of Nevada. The Battle Mountain BLM District covers approximately 11 million acres and includes portions of Eureka, Lander and Nye Counties. The species documented in the following report data records compiled from sightings, current literature and the records of scientists who have collected in the area.

Characteristic big game species in the region include elk, bighorn sheep, mule deer, pronghorn and mountain lion. Wild horses, introduced into the area by European man, are common to many valleys along with wild burros. Both are protected by the Wild Free-Roaming Horse and Burro Act of 1971 and compete for forage with domestic livestock and native species. The rodent family accounts for most of the mammals. A great number of bird species exist in the district, with the highest diversity in the mountain and riparian habitats. Some of the valley wetland habitats are stopovers or breeding grounds for numerous migratory waterfowl and shorebirds. Reptile species diversity is low due to the relatively low mean annual temperatures in conjunction with the somewhat less suitable habitat in the valleys. Amphibian species diversity is also low due to the aridity, low occurrence of summer rains and isolation from colonizing sources.

Aquatic habitats are primarily limited to springs and a few perennial streams, mostly in the mountains. However, the limited surface waters contain a variety of fish species and other aquatic biota. Numerous fish species have been introduced by man and, unfortunately, many proved detrimental to the native species. An account of some of the wildlife communities has been abstracted from the M-X ETR 15 on wildlife (HDR, 1980b), and are presented below. Figure 2-3 illustrates plant and animal relationships for some common species.

Plant Communities	Pinyon Juniper Woodlands	Great Basin Sagebrush	Joshua Tree Woodland (So. Valleys)	Shadscale Scrub	Shadscale Scrub (Sparse)	Desert Marsh	Alkali Sink Scrub
Common Plants	Single-Leaved Pinyon Utah Juniper Great Basin Sagebrush Bitterbrush	Great Basin Sagebrush Bitterbrush Ribber Rabbitbrush Squirrel Tail	Joshua Tree Sagebrush and Shadscale Species	Shadscale Four-Wing Saltbush Budsage Hopsage	Shadscale Winterfat Four-Wing Saltbush Budsage	Bulrush Cat-Tail Alkali Saccaton Tule	Greasewood Saltgrass Saltbush



Source: HDR, 1980a. **Figure 2-3 Regional Plant and Animal Relationships along an Elevational Gradient**

Depending on the habitat, some of the more ubiquitous species include the side-blotched lizard (Uta stansburiana), whiptail lizard (Cnemidophorus tigris), gopher snake (Pituophis melanoleucus), Great Basin rattlesnake (Crotalus viridis lutosus), white-tailed antelope ground squirrel (Ammospermophilus leucurus), desert cottontail rabbit (Sylvilagus auduboni), black-tailed jackrabbit (Lepus californicus), coyote (Canis latrans), horned lark (Eremophila alpestris), raven (Corvus corax) and redtailed hawk (Buteo jamaicensis).

The sage thrasher (Orcoscoptes montanus) nests exclusively in tall sagebrush and the sagebrush vole (Lagurus curtatus) is restricted to big sage throughout the Great Basin. The sagebrush lizard (Sceloporus graciosus) is not restricted to big sage, but is most common at the middle elevations where sage habitat is common. The Great Basin pocket mouse (Perognathus flavus) is typical of sagebrush habitat as are least chipmunks (Eutamias minimums). A variety of raptors, including the marsh hawk (Circus cyaneus) and golden eagle (Aquila chrysaetos), forage in the big sage habitat type, which is often considered the characteristic plant of the Great Basin.

The Great Basin kangaroo rat (Dipodomys microps) is closely associated with shadscale habitat which is found in the lower, but well-drained portions of valleys and has special behavioral and morphological adaptations for eating the leaves of saltbush (Renagy, 1972). Several lizard and snake species are common in the shadscale/black sage/greasewood habitat. Among these are the zebra-tailed lizard (Callisaurus draconoides), the side-blotched lizard, and the desert horned lizard (Phrynosoma platyrhinos). The collared lizard (Crotaphytus collaris) commonly occurs in rock outcrops within this habitat. The Great Basin rattlesnake is seen in many habitats throughout the Great Basin and the gopher snake is common in the shadscale and big sage habitats. Black-throated sparrows (Amphispiza bilineata) are summer residents and horned larks and loggerhead shrikes (Lanius ludovicianus) are permanent residents in both shadscale and big sage habitats. Horned larks are especially noticeable during winter when they form large flocks. Many animals typical of the more southern deserts such as the long-nose snake (Rhinocheilus lecontei) and desert spiny lizard (Sceloporus magister) are also found in the shadscale community.

Scrub jays (Aphelocoma coerulescens), mountain bluebirds (Sialia currucoides) and dark-eyed juncos (Junco hyemalis) are found in pinyon-juniper woodland at lower elevations. Many other species found in the pinyon-juniper woodland are the same as those in the big sage community.

An especially diverse avifauna which includes warblers, flycatchers, magpies (especially near farmlands) and various raptors is associated with riparian habitats which occur around springs and along streams and arroyos in many valleys. A variety of warblers is found in tree plantations which are associated with towns, ranches and springs in the Great Basin. These planted trees form a distinct habitat type with a diverse bird life including the robin (Turdus migratorius), house sparrow (Passer domesticus), great-horned owl (Bubo virginianus) and Cooper's hawk.

Cottontail rabbits are relatively common in brushy floodplain habitats, as well as along arroyos and irrigation ditches. The Great Basin spadefoot toad (Scaphiopus intermontanus) often breeds in permanent or seasonal ponds in low valley areas during spring runoff and forages there during a short period of time. This species spends the remainder of the year buried in the soil on the playa fringes.

The leopard frog (Rana pipiens) and the bullfrog (Rana catesbiana), two of the few aquatic amphibians found in the Great Basin, can be found in springs and water catchments. Amphibians, in general, are not found in large numbers in the Great Basin.

Mountain streams contain cold water gamefish such as rainbow trout (Salmo gairdneri), brown trout (S. trutta), subspecies of cutthroat trout (S. clarki) and brook trout (Salvelinus frontinalis). These forms, particularly rainbow trout, are also found in most permanent large area habitats.

2.2.1.1 Mammals

Mammals within the Battle Mountain BLM District are listed in Table 2-4, numbering to 69 species. Some of the big game and more common species are discussed in detail.

Table 2-4 List of the Mammals of the Battle Mountain BLM District

SHREWS:

Vagrant shrew (Sorex vagrans). Found in mountain areas along stream banks and marshy areas.

Water shrew (Sorex palustris). Found in mountains along cold streams.

BATS:

Little brown myotis (Myotis lucifugus). Often found near water.

California myotis (Myotis californicus). Common in the lower desert areas. A cave bat.

Long-eared myotis (Myotis evotis). Found mainly in areas with trees.

Long-legged myotis (Myotis volans). Common in tree areas and around water.

Small-footed myotis (Myotis subulatus). Usually found below 6,500 feet. Uses niches in rocks, trees, or buildings to roost.

*Spotted bat (Euderma maculata). Very rare in State-may be located in District. Please report any findings.

Hoary bat (Lasiurus cinereus). A colonial bat found in the lower areas of the District.

Big brown bat (Eptesicus fuscus). Common. A cave bat.

* On list of rare and endangered species for United States.

Table 2-4 List of the Mammals of the Battle Mountain BLM District (cont.)

Western pipistrelle (Pipistrellus hesperus). In western and southern parts of the State.

Long-eared bat (Corynorhinus rafinesquii). Found occasionally.

Palled bat (Antrozous pallidus). A common cave bat in southern part of the District.

Mexican freetail bat (Tadarida brasiliensis). A common cave bat. Distribution limited to southern part of District.

WEASEL FAMILY:

Short-tailed weasel (Mustela erminea). Found in the higher mountains of the District, but travels to lower elevations during winter.

Long-tailed weasel (Mustela frenata). Located throughout District.

Mink (Mustela vison). Habitat restricted to lakes, streams, and water courses.

River otter (Lutra canadensis). Found along Humboldt River.

Spotted skunk (Spilogale gracilis). Occasional in District. Nocturnal in habits.

Badger (Taxidea taxus). Fairly common through the District.

Table 2-4 List of the Mammals of the Battle Mountain BLM District (cont.)

DOG FAMILY:

Red fox (*Vulpes fulva*). Recorded in southern portions, but not common.

Kit fox (*Vulpes macrotis*). Found at lower elevations. Small, big-eared fox.

Gray fox (*Urocyon cinereoargenteus*). Found mainly in southern portion of District.

Coyote (*Canis latrans*). Common throughout the District.

CAT FAMILY:

Mountain lion (*Felis concolor*). Found in most higher elevation areas.

Bobcat (*Lynx rufus*). Common in entire region, although not abundant.

RODENT FAMILY:

Yellow-bellied marmot (*Marmota flaviventris*). Very few sightings have been made of this species in the District. Found in higher mountain areas.

Townsend ground squirrel (*Spermophilus townsendi*). Distributed throughout area, commonly seen.

Richardson ground squirrel (*Spermophilus richardsoni*). Found in the Diamond Valley area of Eureka County.

Table 2-4 List of the Mammals of the Battle Mountain BLM District (cont.)

Belding ground squirrel (Spermophilus beldingi). Noted to exist in most of the District.

Rock Squirrel (Spermophilus variegatus). Inhabit southern portion of District.

Antelope ground squirrel (Spermophilus leucurus). Common throughout the District.

Golden-mantled ground squirrel (Spermophilus lateralis). Found in higher elevations. Mistakenly called a chipmunk.

Lease chipmunk (Eutamias minimus). In sagebrush areas and valleys. Smallest of Nevada chipmunks.

Cliff chipmunk (Eutamias dorsalis). Among pinon and junipers.

Say chipmunk (Eutamias quadrivittatus). Higher zones of the isolated central mountain ranges.

Little pocket mouse (Perognathus longimembris). Found in very arid areas.

Great Basin pocket mouse (Perognathus parvus). Inhabits areas far from water.

Long-tailed pocket mouse (Perognathus formosus). Found in eastern part of District in stony habitats.

Table 2-4 List of the Mammals of the Battle Mountain BLM District (cont.)

Dark kangaroo mouse (Microdipodops megacephalus). Most freqeuently found in central and western part of District.

Pale pygmy kangaroo rat (Microdipodops pallidus). Within District, restricted to western Nye County.

Ord kangaroo rat (Dipodomys ordi). The most common kangaroo rat, located in lower elevation areas.

Great Basin kangaroo rat (Dipodomys microps). Found in sagebrush and shadscale, greasewood communities.

Valley pocket gopher (Thomomys bottae). Common throughout District.

Northern grasshopper mouse (Onychomys leucoyaster). Common in upper Sonoran Life-zone.

Southern grasshopper mouse (Onychomys torridus). Occupies lower areas in Southern portion of District.

Western harvest mouse (Reithrodontyomys megalotis). May be found anywhere in area, but especially in grassy places near water.

Canyon mouse (Peromyscus crinitus). Lives in stony places amoung rocks, especially in canyons.

Deer mouse (Peromyscus maniculatus). One of most abundant rodents, almost anywhere.

Pinon mouse (Peromyscus truei). Generally found in rocky areas supporting pinon pines.

Table 2-4 List of the Mammals of the Battle Mountain BLM District (cont.)

Long-tailed meadow mouse (Microtus longicaudus). Mostly found in the higher mountainous areas.

Montane meadow mouse (Microtus montanus). Found in higher areas throughout District.

Sagebrush vole (Lagurus curtatus). Lives in colonies in brush communities.

Bushy-tailed wood rat (Neotoma cinerea). Common in District. Characteristically builds nests of sticks and similar material.

Desert wood rat (Neotoma lepida). Occurs in lower areas of District. Nest is a mound of sticks.

House mouse (Mus musculus). Non-native, but now distributed throughout District.

Big jumping mouse (Zapus princeps). Inhabits the higher portions of District. Often lives near streams. Nocturnal.

Muskrat (Ondatra zibethica). Aquatic. Often builds nest in waters.

Beaver (Castor canadensis). Largest rodent, inhabits aquatic areas.

Porcupine (Erethizon dorsatum). Found in sagebrush and meadows as well as forests.

Pika (Ochotona princeps). Found in rocky slopes at high elevations.

White-tailed jackrabbit (Lepus townsendi). Very rare in District.

Table 2-4 List of the Mammals of the Battle Mountain BLM District (cont.)

Black-tailed jackrabbit (Lepus californicus). Very common and abundant throughout District.

Nuttail cottontail (Sylvilagus nuttalli). Rather common, especially along streams and canyons.

Audubon cottontail (Sylvilagus auduboni). Restricted to southern part of District.

Pygmy rabbit (Sylvilagus idahoensis). Mainly found in areas of big sage plant communities.

Mule deer (Odocoileus hemionus). Common throughout District. 35% inhabit the mountain ranges of Elko county including Toquina Range.

Pronghorn antelope (Antilocapra americana). Open rangelands habitat. Are found in Smith Creek Valley and the southern valleys of the District.

BIGHORN SHEEP:

Bighorn sheep (Ovis canadensis). Uncommon in District, restricted to high mountain areas. Found primarily in Elko and White Pine Counties.

During historical times, several mammalian taxa were exterminated in the region. These include wolf (Canis lupus), grizzly bear (Ursus arctos), elk (Cervus canadensis) and bighorn sheep (Ovis canadensis) (Currey and James, 1982:43; Grayson, 1982; Hall, 1961). Elk and bighorn sheep have been reintroduced in some areas of eastern and central Nevada. Another faunal change involves that of mule deer (Odocoileus hemionus) which have increased considerably since the early historic period (Currey and James 1982:43; Grayson, 1982).

Most of the mammals within the district are representative of the Transition and Canadian life zones, with an association of some Upper Sonoran life zone mammals (Hall 1946).

Mule Deer (Odocoileus hemionus). The mule deer inhabits the deserts, prairies and mountains of the western states. This open-country deer is widely distributed in North America, ranging from southeastern Alaska to Mexico, east to Hudson Bay, Minnesota and western Texas. Habitat loss and overhunting reduced populations in many areas during the 1800's (Wallamo, 1978). In the Great Basin, however, deer were historically quite sparse. With the decline in cattle and sheep grazing, depleted ranges revegetated with more shrubs necessary to support deer (Papez, 1976) and the deer population expanded. The mule deer in Nevada prefer higher elevations, and as such, are somewhat of a montane species. Mule deer also have seasonal ranges and may travel extensively between winter and summer ranges. Summer ranges are at higher elevations, sometimes as high as 8,000 feet, where water and forage are available during the hot, dry months. When the temperatures drop and the mountains accumulate deep snows, the deer move down to lower elevations and sheltered valleys where they often concentrate in areas providing forage and cover. These areas are critical for deer survival (Wallamo, 1978). Deer migrate between these seasonal ranges along fairly well established routes. Migration to other areas is also common.

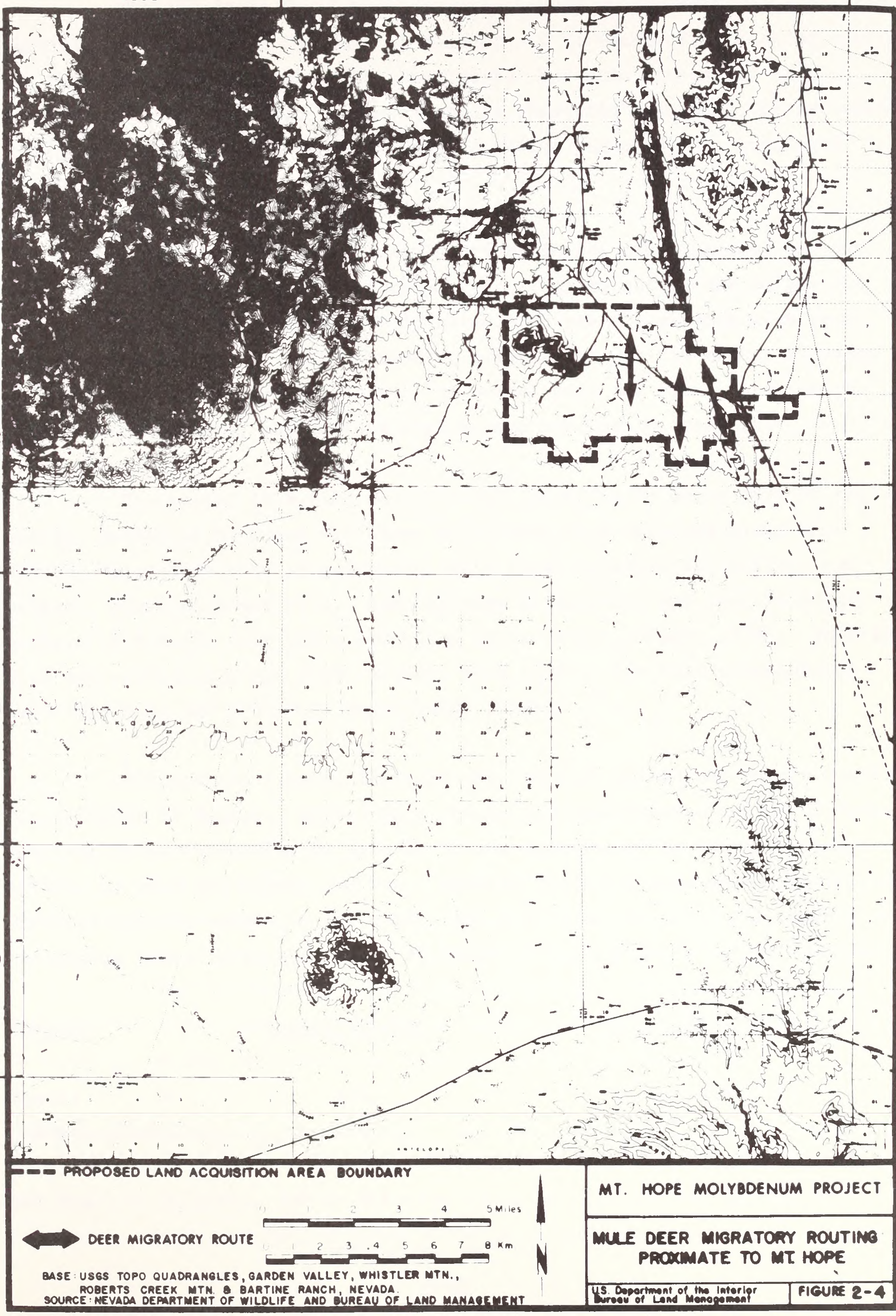
The deer have definite water needs that must be met and are aware of every water source in their area. Deer can eat almost any vegetation they encounter, however, definite food preferences exist. Rue (1968) accounts for some of these preferences as follows: "Grasses are an important summer food.

Fescue grass, bluegrass, bromegrass, wheat grass, grama grass, rice grass and needlegrass are the most important herbage. In the winter, the mule deer abandon their winter range because of deep snow, for they seldom paw through even shallow snow to get at the grasses. Instead they start to feed more heavily upon browse. Snowberry, bearberry, serviceberry, cedar, oak, mountain mahogany, cliffrose, sagebrush, jack pine, sunflower, fir, poplar and bitterbrush are favored mule-deer foods. Mule deer also eat fungus, ferns, berries, acorns, nuts, cactus fruit and many of the local wildflowers."

Population estimates indicate that approximately 35 percent of the deer in Nevada inhabit the mountain ranges of Elko County (Tsukamoto, 1979a). Within eastern Nevada, high numbers (17,700) occur in the Ruby Mountains (Nevada Dept. Wildlife, 1980) and moderate numbers inhabit most of the ranges southwestward to, and including, the Toiyabe, Toquima, and Monitor Ranges. Moderate abundances are estimated for the Schell Creek, Snake, and Wilson Creek Ranges as well. Other ranges generally support relatively low numbers of deer.

The Mt. Hope site study area lies within the Roberts Creek Mountain zone of mule deer winter rangeland. The site study area additionally includes distinct migratory routes (Figure 2-4) of winter range access to and from the Bald Mountain winter range area. Range values (regional) are reportedly fair. During severe winters, southward migration can extend to Nye County (Final Shoshone-Eureka RMP/EIS, 1984). Specific baseline population counts are not available for the area. Although as many as 500 to 1,500 deer may pass through the Tyrone Gap area during the summer/winter migration period of 2 to 3 weeks, it is further estimated that approximately 200 deer move through the site proper compared to a population estimate of 4,000-4,500 deer for Eureka County (D. Elliott, personal communication, 1983). The present legal harvest for Management Area 14 has ranged from 788-1,183 animals (1978-1983).

Bobcat (Lynx rufus). The bobcat, also called wildcat or Bay lynx, lives anywhere in North America where there is sufficient forest and brushland to provide food and cover.


R50E
R51E
R52E
T 23 N
T 22 N
T 21 N
T 20 N
PROPOSED LAND ACQUISITION AREA BOUNDARY
DEER MIGRATORY ROUTE
0 1 2 3 4 5 Miles
0 1 2 3 4 5 6 7 8 Km
N
BASE: USGS TOPO QUADRANGLES, GARDEN VALLEY, WHISTLER MTN., ROBERTS CREEK MTN. & BARTINE RANCH, NEVADA.
SOURCE: NEVADA DEPARTMENT OF WILDLIFE AND BUREAU OF LAND MANAGEMENT
MT. HOPE MOLYBDENUM PROJECT
MULE DEER MIGRATORY ROUTING PROXIMATE TO MT. HOPE
U.S. Department of the Interior
Bureau of Land Management
FIGURE 2-4

The bobcat is found from southern Canada to the Maritime Provinces, southward to Mexico and the Gulf of Mexico. It is absent from much of central and eastern U.S. except along the Mississippi and Ohio rivers and in the Appalachian Mountains (Rue 1968). Range is presently extending into southern Canada, and receding from the Mississippi Valley region due to continued pressure.

Bobcats are solitary animals. They do not truly migrate but may move into a new area due to food abundance. They do not return to the old area. Home ranges vary from 5 to 50 miles in diameter, varying with food scarcity and the advent of the breeding season. Due to the recent increase in demand for certain animal pelts, the bobcat pelt has risen in value the most in recent years, making them high demand species by trappers.

The bobcat in Nevada can be found in virtually every part of the state. Preferred habitats are those areas with rock outcrops mixed with shrubby vegetation such as sagebrush, wild rose, chokecherry, willow, and others. Riparian zones (i.e., near streams or marshes) may contain larger numbers of bobcats than the surrounding drier areas (Ashman, 1979). Jackrabbits and cottontails are their primary food source, but they occasionally kill mule deer and pronghorn young (HDR, 1980b).

Bobcats are common, although not abundant within the Battle Mountain BLM District of Nevada. Review with the Nevada Department of Wildlife indicates that the prime furbearers on site or in the vicinity of Mt. Hope include bobcat, as well as, coyote and fox. Species requiring more water (beaver and muskrat) are not common in the area. The following indicates the numbers of furbearers taken in Eureka County followed by the percent of state harvest.

Species	Eureka Harvest	% of State Harvest
Coyote	575	4.1
Bobcat	212	5.6
Gray Fox	10	1.1
Kit Fox	0	0

All of these species are likely to occur on site, although their population abundance is not known. Trapping of bobcat and coyote are known to have occurred on site (D. Elliot, personal communication, 1983). A single gray fox was observed during a late winter, 1983, WRC site visit.

Coyote (*Canis latrans*). The coyote is a wild dog, often referred to as a small prairie wolf. The coyote was once only native to the western plains, but has proved to be a hardy and prolific species spreading across North America. Coyotes are presently hunted in the West for their pelts, especially during the winter when the pelt is prime. They are often considered significant nuisance species by livestock and poultry raisers.

The Coyote is found in western North America from the Arctic Ocean to Mexico, eastward to James Bay, southern Quebec, Vermont, and to the Mississippi River in the south (Rue 1968). Reports indicate that the coyote occurs in most of the other eastern states, where they have spread both naturally and from introductions. In many areas of the southwest they occur in large numbers varying with prey availability.

Coyotes are omnivorous and opportunistic feeders, often eating anything it can find. Favored foods are rabbits, mice, rats and prairie dogs. They will also feed upon carrion, fruits, berries and melons (wild and domesticated), in addition to livestock poultry if the opportunity presents itself. The home range for a coyote is two or three miles when food is plentiful. This may be extended to as much as 100 square miles in its patrolling for food during the winter. The young of each coyote litter often extend further into virgin areas, thus establishing new range.

In Nevada, coyotes are not protected and are trapped for their pelts. They are found in almost every habitat of the mountains and valleys. Coyotes are common throughout the Battle Mountain BLM District.

Gray Fox (*Urocyon cinereoargenteus*). The gray fox lives in brushy country and open forests across the southern U.S, northward in the west to Washington and northern Colorado, and to southern Canada in central and eastern North America; a second species, *Urocyon littoralis*, inhabits some of the channel

islands of the southern California coast (Rue, 1968).

The gray fox prefers habitat areas of dense cover but is also found in swamplands, areas of heavy second growth, in mesquite thickets and along rocky ridges.

The gray fox may range over an area of 10 square miles. Preferred foods are ground-nesting birds (particularly grouse) and their eggs, rabbits, hares, rats, mice, snakes and insects. Also included in the diet are berries, fruits, melons and some grains.

In Nevada, gray foxes are found in the southern half of the state (Ashman, 1979) and, similarly, found primarily in the southern portion of the Battle Mountain BLM District. They occupy much of the same habit types as bobcats, being found in pinyon-juniper woodlands, northern desert shrub (Upper Sonoran), chaparral (Mahogany-mountain brush) and in the southern desert shrub type (Hall 1946; Deacon et al., 1964).

Kit Fox (Vulpes macrotis). The kit fox, also called swift fox, is the smallest of the foxes in the U.S. It is nocturnal and occupies the dry plains and deserts of the West. This open-country, low elevation species shows the strong molding that an environment imposes upon an animal. In this case, selective pressures have favored small size, pale coloration and large ears for the semi-desert environment of the kit fox.

Kit foxes are listed as furbearers in Nevada and many were taken in Clark and Lincoln Counties in 1978 (Molini and Barngrover, 1979). They are found only in valleys and foothills wherever sufficient prey abounds (Ashman, 1979). Their primary diet consist of jackrabbits, cottontails and small rodents.

Badger (Taxidea taxus). The badger is a husky specialized member of the weasel family. It is one of the best hole diggers in existence; the holes are dug in search of food, usually being ground squirrels. The badger has become known as a fierce, intermediate-sized predator of the grassland community of interior North America. In the West, the badger also feeds upon rodents.

Badgers are common throughout the Battle Mountain BLM District. Occurrence in the Mt. Hope area has not been determined.

Porcupine (Erethiyon darsatum). The porcupine is the second largest rodent in North America, exceeded only by the beaver.

The porcupine does most of its feeding at night, generally inhabiting forests, but is also found in brush and desert areas. It ranges from the limit of trees in Alaska and Canada, south to the Mexican border in the West, and to the northern states in the east, south in the mountains to Virginia (Rue, 1968).

Porcupines usually den up in small rock caves or rocky ledges. If these are not available, hollow trees, hollow logs and underground burrows will suffice. Rue (1968) gives a good account of the procupine's habits and diet: diet is predominantly tree bark but does not include succulents as well as cultivated crops of alfalfa, clover, melons, etc.

Within the Battle Mountain BLM District, the porcupine is found in sagebrush, meadows and forests. Occurrence in the Mt. Hope area has not been determined.

Ground Squirrels (genus Spermophilus). Ground squirrels occur almost everywhere in western North America, ranging from the Arctic to Mexico and eastward to Ohio. There are 23 species of this genus, of which six species reside within the Battle Mountain BLM District. Three common species within the District are golden-mantled ground squirrel (Spermophilus laterolis), Townsend ground squirrel (Spermophilus townsendi) and the antelope ground squirrel (Spormophilus leucurus). Another species, the Richardson ground squirrel (Spermophilus richardsoni) is found in the Diamond Valley area of Eureka County.

All ground squirrels dig burrows, usually staying close enough to seek shelter when danger approaches. Ground squirrels eat seeds, grass and insects. Some ground squirrels store their food, most hibernate during the winter months while some of the desert species may estivate, becoming dormant during the hot, dry season. Ground squirrels are common

in the Mt. Hope area.

Black-tailed Jackrabbit (Lepus californicus). The black-tailed jackrabbit is a misnomer, the jack is actually a true hare and not a rabbit, for its young are born in the open country (not in a den or burrow), fully furred, eyes open and able to run almost immediately.

The black-tailed jack is smaller than its cousin, the white-tailed jackrabbit, weighing between 4 and 7-1/2 pounds. The ears are extremely long, measuring up to seven inches.

The black-tailed jack inhabits open grasslands and desert of the western U.S. from central Arkansas to the Pacific Coast, north as far as southeastern Washington in the west and to central South Dakota in the east (Rue, 1968). The species is very common and abundant throughout the Battle Mountain BLM District and occurs in the Mt. Hope area.

The black-tailed jack seldom leaves its home area and may spend its entire life within a four square mile area. Under conditions of severe drought when all vegetation is scorched the jack will travel further, sometimes as much as 20 miles. Jackrabbits seldom drink water, obtaining sufficient moisture from the vegetation they eat. The blacktailed jack does not dig burrows, but establishes three or four forms (slight depressions scraped out of the ground) which they frequent.

Jackrabbits eat almost any type of vegetation they encounter (Rue, 1968). Grasses, weedy plants and shrubs make up the diet bulk. Main food items are snakeweed, rabbit brush, mesquite, grama grass, sagebrush, greasewood, saltbrush, filaree, prickly pear, spiderling and eriogonum. Wherever minerals, salts and trace elements occur, jackrabbits ingest the soil for its nutritional value. They also feed on alfalfa and truck-farm produce.

2.2.1.2 Birds

All birds in Nevada are protected by Federal and/or State law with the exception of the starling and house sparrow. Birds within the Battle

Mountain BLM District are listed in Table 2-5 and total 208 species. These include native and introduced species, as well as migratory birds. Ducks, geese and swans use the Pacific Flyway of which Nevada is a part. It is estimated that more than one-half million waterfowl use the migration route through Nevada annually (Walstrom, 1973). The abundance and occurrence of each species is not complete, but some of the more common or imported species pertinent to the Mt. Hope area are discussed in the following.

Mourning Dove (Zenaidura macroura marginella). Probably the most abundant game birds in the District, mourning dove occur occurring in most habitat types from spring to September, after which they migrate south. They spend a great amount of time on the ground, searching for their staple diet of weed seeds and grains. Greatest densities are found in riparian and agricultural areas. Based on recent data, the counties in eastern Nevada with the greatest harvest of mourning doves are Clark, Elko and White Pine counties (Molini and Barngrover, 1979; Leatham and Bunnell, 1979).

Nesting of dove on-site is likely but numbers are unknown (D. Elliott, personal communication, 1983). Eureka County harvest totalled 897 to 2,784 annually during 1976-1980.

Chukar Partridge (Alectoris chukar). An introduced species which has established itself in sufficient numbers to be considered an abundant and prized game bird of Nevada. Chukar inhabit shrub grasslands in most of the mountain ranges and descend into valleys when snow covers forage plants (HDR, 1980b). Christensen (1970) has designated the eastern and southern portions of Nevada to have the lowest population densities.

Little is known of chuckar populations in the Mt. Hope area. During the 1976-1980 period total reported hunters in Eureka County ranged from 230-889 per year with a total harvest of 896-7,538 birds. Since the bag limit has increased during the 1976-1981 period while the total harvest has also increased, it is assumed chuckar populations in the county are increasing.

Sage Grouse (Centerocercus urophasianus). Similar to quail, sage grouse are chicken-like birds of the open prairies, wooded regions, deserts (particularly

Table 2-5 List of the Birds Found in the Battle Mountain BLM District

LOONS
- Common Loon

GREBES
- Horned Grebe
- Eared Grebe
- Western Grebe
- Pied-billed Grebe

PELICANS & CORMORANTS
- White Pelican

HERONS AND ALLIES
- Great Blue Heron
- Common Egret
- American Bittern
- Black-crowned Night Heron
- Snowy Egret
- White-faced glossy Ibis

WATERFOWL
- Whistling Swan
- Canada Goose
- White-fronted Goose
- Snow Goose
- Mallard
- Gadwell
- Pintail
- Green-winged Teal
- Blue-winged Teal
- Cinnamon Teal
- American Wigeon
- Shoveler
- Wood Duck
- Redhead
- Ring-necked Duck
- Canvasback
- Lesser Scaup
- Common Goldeneye
- Bufflehead
- Ruddy Duck
- Hooded Merganser
- Common Merganser
- Red-breasted Merganser

VULTURES, HAWKS & FALCONS
- Turkey Vulture
- Goshawk
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-tailed Hawk

VULTURES, HAWKS & FALCONS continued
- Swainson's Hawk
- Rough-legged Hawk
- Ferruginous Hawk
- Golden Eagle
- *Bald Eagle
- Marsh Hawk
- Osprey
- Prairie Falcon
- Pigeon Hawk
- Sparrow Hawk

GALLINACEOUS BIRDS
- Blue Grouse
- Sage Grouse
- California Quail
- Ring-necked Pheasant
- Chukar Partridge
- Hungarian Partridge
- Snow Partridge

CRANES AND ALLIES
- Greater Sandhill Crane
- Virginia Rail
- Sora Rail
- American Coot

SHOREBIRDS
- Killdeer
- Common Snipe
- Long-billed Curlew
- Spotted Sandpiper
- Solitary Sandpiper
- Willet
- Greater Yellowlegs
- Western Sandpiper
- American Avocet
- Black-necked Stilt
- Wilson's Phalarope
- Northern Phalarope

GULLS, TERNS
- California Gull
- Ring-billed Bull
- Forester's Tern
- Caspian Tern
- Black Tern

DOVES
- Mourning Dove

*Endangered species

Table 2-5 List of the Birds Found in the Battle Mountain BLM District (cont.)

OWLS
- Screech Owl
- Great Horned Owl
- Burrowing Owl
- Long-eared Owl
- Short-eared Owl
- Saw-Whet Owl

GOATSUCKERS
- Poor-will
- Nighthawk

SWIFTS
- White-throated Swift
- Vaux Swift

HUMMINGBIRDS
- Costa's Hummingbird
- Broad-tailed Hummingbird
- Rufous Hummingbird
- Calliope Hummingbird

KINGFISHERS
- Belted Kingfisher

WOODPECKERS
- Red-shafted Flicker
- Lewis Woodpecker
- Yellow-bellied Sapsucker
- Hairy Woodpecker
- Downy Woodpecker

FLYCATCHERS
- Eastern Kingbird
- Western Kingbird
- Ash-throated Flycatcher
- Say's Phoebe
- Traill's Flycatcher
- Western Flycatcher
- Hammonds' Flycatcher
- Dusky Flycatcher
- Gray Flycatcher
- Wood Pewee
- Olive-sided Flycatcher

LARKS
- Horned Lark

SWALLOWS
- Violet-green Swallow
- Tree Swallow
- Bank Swallow
- Rough-winged Swallow
- Barn Swallow

JAYS, MAGPIES & CROWS
- Scrub Jay

JAYS, MAGPIES & CROWS continued
- Black-billed Magpie
- Common Raven
- Crow
- Pinyon Jay
- Clark's Nutcracker

CHICKADEES & ALLIES
- Mountain Chickadee
- Plain Titmouse
- Bushtit

NUTHATCHES
- White-breasted Nuthatch
- Red-breasted Nuthatch

DIPPERS AND WRENS
- Dipper
- House Wren
- Rock Wren
- Long-billed March Wren
- Canyon Wren

MOCKING BIRDS AND THRASHERS
- Mockingbird
- Brown Thrasher
- Sage Thrasher

THRUSHES
- Robin
- Hermit Thrush
- Swainson's Thrush
- Western Bluebird
- Mountain Bluebird
- Townsend's Solitaire

KINGLETS & ALLIES
- Blue-gray Gnatcatcher
- Golden-crowned Kinglet
- Ruby-crowned Kinglet
- Water Pipit

WAXWINGS
- Bohemian Waxwing
- Cedar Waxwings

SHRIKES, STARLINGS
- Northern Shrike
- Loggerheaded Shrike
- Starling

VIREOS
- Solitary Vireo
- Warbling Vireo

WARBLERS
- Orange-crowned Warbler
- Virginia's Warbler

Table 2-5 List of the Birds Found in the Battle Mountain BLM District (cont.)

WARBLERS continued
- Yellow Warbler
- Myrtle Warbler
- Audubon's Warbler
- Black-throated Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- MacGillirray's Warbler
- Yellowthroat
- Yellow-breasted Chat
- Wilson's Warbler

WEAVER FINCHES
- House (English) Sparrow

BOBOLINKS, BLACKBIRDS ORIOLES
- Bobolink
- Western Meadowlark
- Yellow-headed Blackbird
- Red-winged Blackbird
- Scott's Oriole
- Bullock's Oriole
- Brewer's Blackbird
- Common Grackle
- Brown-headed Cowbird

TANAGERS
- Western Tanager

GROSBEAKS, FINCHES, SPARROWS & BUNTINGS
- Black-headed Grosbeak
- Indigo Bunting
- Lazuli Bunting
- Evening Grosbeak
- Cassin's Finch
- House Finch
- Gray-crowned Rosy Finch
- Pine Siskin
- American Goldfinch
- Lesser Goldfinch
- Red Crossbill
- Green-tailed Towhee
- Rufus-sided Towhee
- Bark Bunting
- Savannah Sparrow
- Grasshopper Sparrow
- Vesper Sparrow

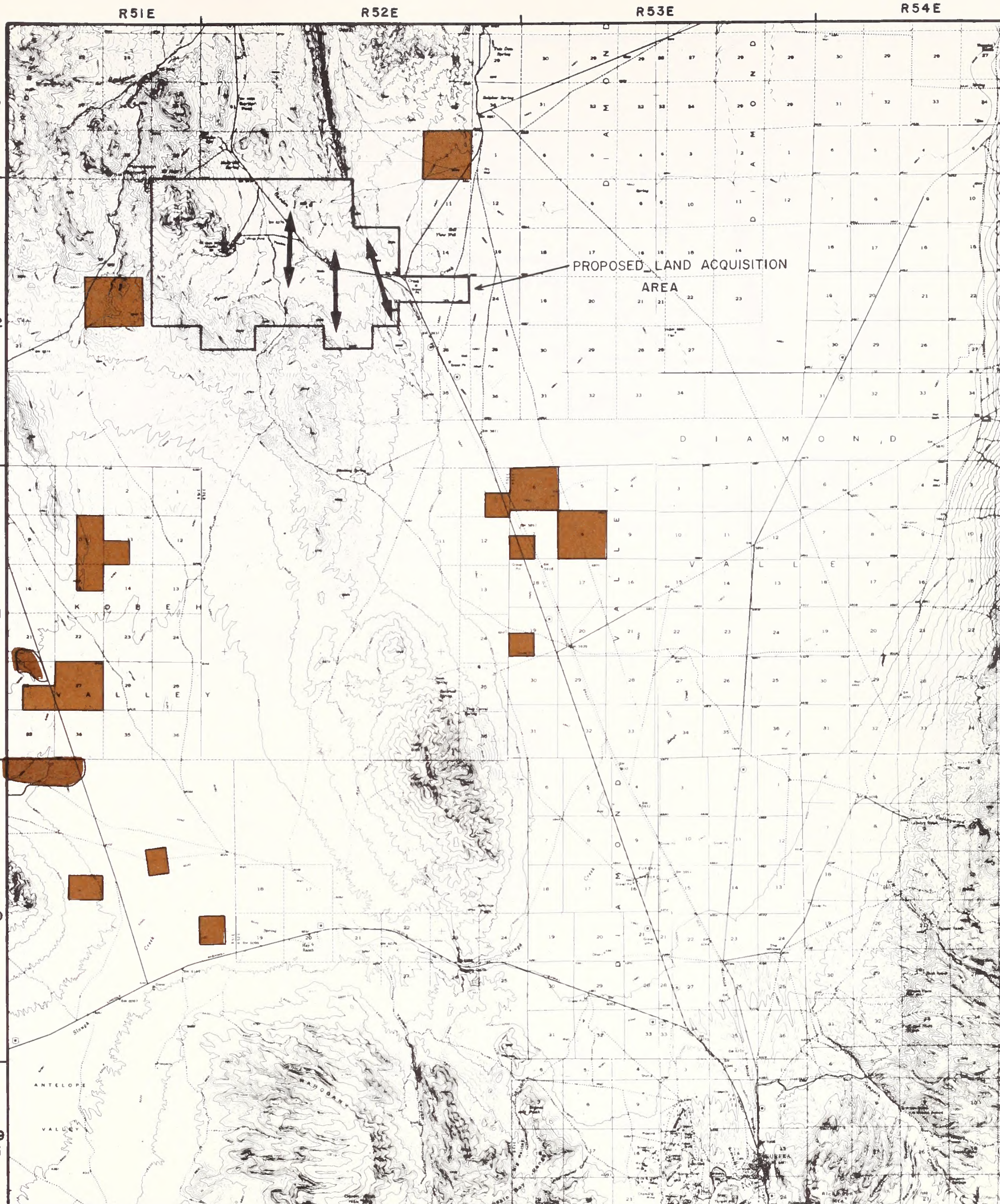
GROSBEAKS, FINCHES, SPARROWS & BUNTINGS continued
- Lark Sparrow
- Black-throated Sparrow
- Sage Sparrow
- Oregon Junco
- Gray-headed Junco
- Tree Sparrow
- Chipping Sparrow
- Brewer's Sparrow
- Harris' Sparrow
- White-crowned Sparrow
- White-throated Sparrow
- Golden-crowned Sparrow
- Fox Sparrow
- Lincoln's Sparrow
- Song Sparrow

Source: U.S.D.I., 1983a

sagebrush habitat) and barren regions of the north or high mountain slopes. They live mainly on the ground where they must scratch for food and also nest. Sage grouse distribution formerly ranged in sagebrush areas from British Columbia and Montana south to eastern California, Nevada and New Mexico, but are becoming increasingly rare in many localities (Booth, 1960). These birds are considered to be significant resource by the Nevada Department of Wildlife.

Sage grouse inhabit upland meadows and valleys in much of the study area. Sagebrush is the preferred habitat and, along with forbs, is the primary food of adults. In spring, males perform courting rituals on established strutting grounds, which are open grassy areas. Nesting occurs on the ground with the vast majority of nests located under sagebrush (Gill, 1965: HDR, 1980b), and with sagebrush canopy coverage in the 20-40 percent range (Patterson, 1952: HDR, 1980b). Brood-use areas are usually located within a 2 mi radius of strutting grounds (Gill, 1975: HDR, 1980b). Broods are greatly dependent on highly nutritious succulent forbs to sustain them during their first months of life. As these forbs dry out during summer at the lower elevations sage grouse and their broods move upward in elevation. During this time mountain meadows become very important to sage grouse survival (Oakleaf, 1971: HDR, 1980b). Sage grouse are known to be negatively affected by sagebrush removal and will abandon strutting grounds, brood use areas, and wintering grounds if adjacent habitat is disturbed (Braun, et al., 1977).

Recent population trends in Nevada indicate that sage grouse populations are either stable or increasing slightly (Molini and Barngrover, 1979). Sage grouse strutting grounds do not occur within the Mt. Hope site study area. Within Kobeh and Diamond Valleys, however, numerous strutting grounds exist; some of which are well established while others appear as annual or infrequent isolates. Figures 2-5 and 2-6 illustrate generalized areas in which strutting grounds were observed or where a high potential existed for such activity. Surveys conducted by BLM in March, 1983 (see Table 2-6) indicated no strutting activity in the areas proximate to the Mt. Hope site study area. The sage grouse strutting ground depicted northeast of the proposed land acquisition border represents an historically active strutting area.



LEGEND

SAGE GROUSE STRUTTING GROUNDS

DEER MIGRATORY ROUTE

BASE: USGS TOPO QUADRANGLES GARDEN VALLEY, WHISTLER MTN., DIAMOND SPRINGS & EUREKA, NEVADA.

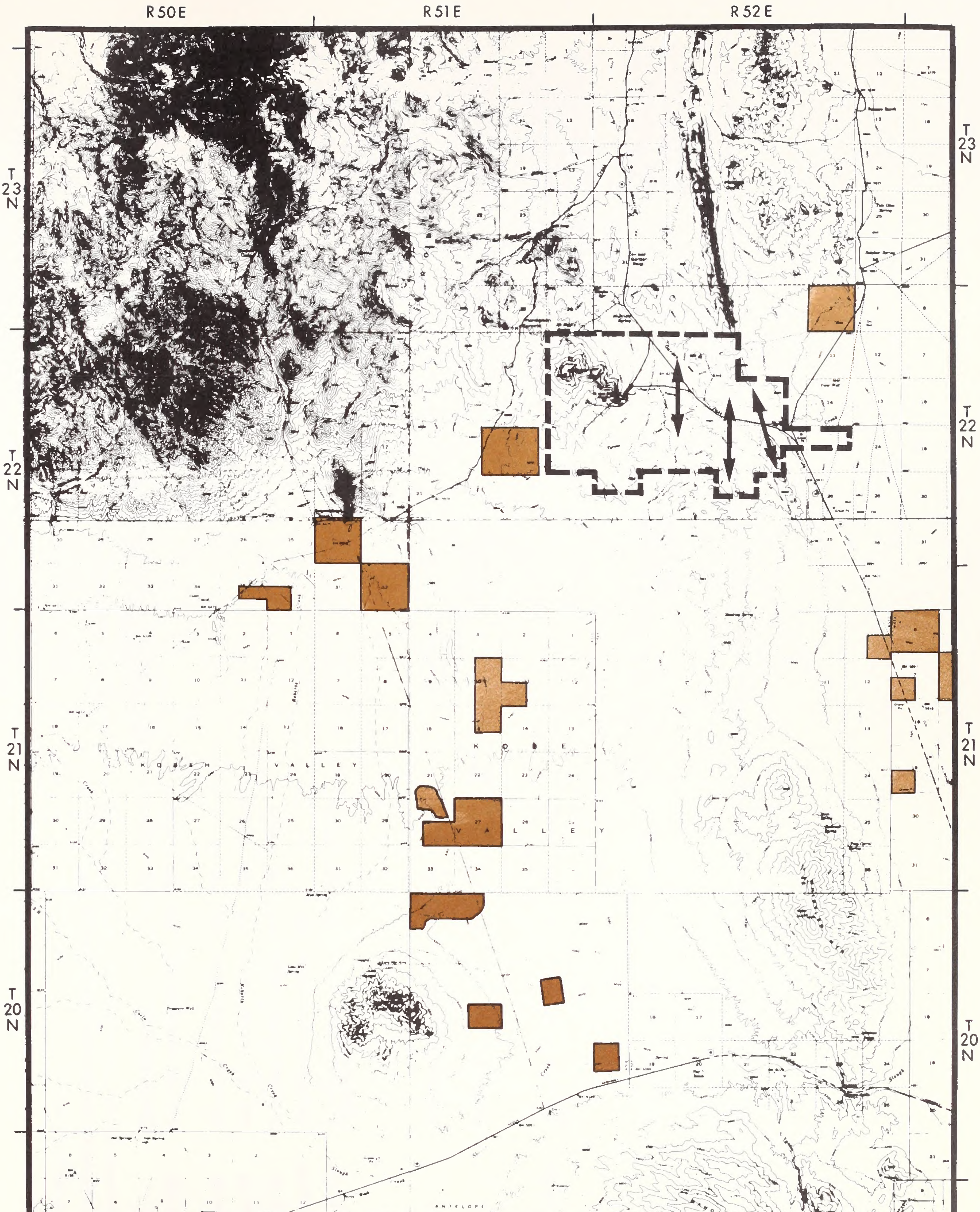
SOURCE: NEVADA DEPARTMENT of WILDLIFE and BUREAU of LAND MANAGEMENT

MT. HOPE MOLYBDENUM PROJECT

SAGE GROUSE STRUTTING GROUNDS AND DEER MIGRATORY ROUTING PROXIMATE TO MT. HOPE

U.S. Department of the Interior
Bureau of Land Management

FIGURE 2-5



PROPOSED LAND ACQUISITION AREA BOUNDARY

SAGE GROUSE STRUTTING GROUNDS

DEER MIGRATORY ROUTE

0 1 2 3 4 5 Miles

0 1 2 3 4 5 6 7 8 Km

BASE: USGS TOPO QUADRANGLES, GARDEN VALLEY, WHISTLER MTN., ROBERTS CREEK MTN. & BARTINE RANCH, NEVADA.
SOURCE: NEVADA DEPARTMENT OF WILDLIFE AND BUREAU OF LAND MANAGEMENT

MT. HOPE MOLYBDENUM PROJECT

SAGE GROUSE STRUTTING GROUNDS AND DEER MIGRATORY ROUTING PROXIMATE TO MT. HOPE

U.S. Department of the Interior
Bureau of Land Management

FIGURE 2-6

Table 2-6 BLM Sage Grouse Strutting Ground Survey of 1983

USGS Quads	General Location	T	R	S	Confirmed			Not Confirmed		Date	Comments
					Air	Fecal Mat.	Ground obs.	Air	Ground		
Whistler Mtn 15'	West Side Diamond Valley	21N	52E	15E1/4					No sign	3-22-83	Not prime looking site.
Whistler Mtn 15'	West Side Diamond Valley	21N	53E	6					No sign	3-22-83	Private agri. land.
Whistler Mtn 15'	West Side Diamond Valley	21N	53E	19SW1/4					No sign	3-23-83	At gravel site.
Whistler Mtn 15'	West Side Diamond Valley	21N	53E	7SW1/4			5 males			3-23-83	West of trails.
Garden Valley 15'	West Side Diamond Valley	22N		2						3-23-83	1 male, no strutting.
Mt. Callagham 15'	Send Grass Valley (Lake Ranch)	20N	45E	15		Old fecal	1 bird			4-6-82	1 bird, not strutting; Lots of old sign. 5-1/2 of section. Heard birds strutting to the south and east, perhaps Sec. 23
Bartine 15'	North Monitor Valley	21N	49E	22		scattered droppings				4-13-83	Zero birds, 8am.
Bartine 15'	Grubb Flat	20N	49E	10E1/2,11W1/2 3S1/2 SE1/4			5 males 3 females			4-13-83 (numerous birds obs. 4-14,15)	In road 8.5 m from 3-Bar Road and Hwy. 50 intersection, 5:10 am.
Roberts Creek Mtn 15'	3 miles South of 3-Bar Ranch	22N	49E	16, 21					Fair amount of scattered sign	4-13-83 (5:30-7:30 am) 4-14-83 (6:30-7:30 am) 4-15-83 (5-6:30 am)	No birds, it doesn't look like strutting habitat, perhaps nesting or wintering area.
Bartine 15'	North Monitor Valley	21N	49E	22			13 birds obs. strutting & were fushed			4-14-83	5:30 am, go 0.35 miles north from fence corner located at Santa Fe turnoff, then 0.75 miles due east of 3-Bar Road.

Table 2-6 BLM Sage Grouse Strutting Ground Survey of 1983 (cont.)

					Confirmed			Not Confirmed			
USGS Quads	General Location	T	R	S	Air	Fecal Mat.	Ground obs.	Air	Ground	Date	Comments
Bartine 15'	1 mile east of Santa Fe Ranch	22N	49E	31E1/2 SE1/4 32SW1/4			1 male (4-13-83 7:30 am) 20 males and 6 females (4-14-83, 6 am)			4-13-83 4-14-83	
Cherry Creek 15'	North end of Buffalo Valley	31N	42E	SW 5 SW1/4			19 males 4-19-83				Started 05:00 Raptor flew over slow until 05:30, peaked at 05:45
Ackerman Cawfer 15'	North Monitor Valley south of Fergusen Ranch	21N	48E	24 13S1/2			20 birds flushed			4-14-83	7:55 am
Ackerman Cawfer 15'	North Monitor Valley south of Fergusen Ranch	21N	48E	23		lots of fresh droppings				4-14-83	8:15 am
Ackerman Cawfor 15'	North Monitor Valley south of Fergusen Ranch	21N	48E	22		lots of dry droppings				4-14-83	8:30-9 am
Bartine Ranch 15'	South of Roberts Creek Ranch	22N	50E	35N1/2 SE1/4 36DW1/4			14 birds flushed from ground, another 17 birds flew off from 1/2 mile north of ground			4-15-83	7am, at trough in seeding sands of road.
Bartine Ranch 15'	1 mile SW of Roberts Mt.	22N	49E	27E1/2 E1/2, 26, 25SW1/4 SW1/4, 34NE1/4 NE1/4, 35, 36NW1/4			In section 26 obs 2 males strutting. In section 36 obs 4 males strutting to 6 females			4-15-83	6:48 am

Source: U.S.D.I., 1983c

Although one male sage grouse was observed on this strutting ground in 1983, no strutting activity was observed. The strutting ground location on the west edge of the Mt. Hope study site was not inventoried in 1983. It was not active in 1981 based on an aerial inventory conducted by BLM.

The most active of sage grouse strutting grounds in the project area involves the section of northern Kobeh Valley (Township 22 North, Range 50 East) in the immediate vicinity of water supply field Alternate 3-C. The strutting grounds closest to Alternate 3-C (Sections 35 and 36) were recorded as active in 1967, 1976, 1981 and 1983 with 40 birds being counted during the 1983 survey. The area is considered by the BLM to be regionally very important.

The strutting grounds in Section 30 were reported active in 1963, 1973 and 1976. No birds were observed in the 1981 inventory. The Section 32 strutting grounds area was recorded as active in 1973 with no birds observed in the 1981 inventory.

Future activity in the three areas includes a significant seeding program as part of the BLM's Vegetal Control Program (Roberts Creek Seedings).

Red-tailed Hawk (*Buteo jamaicensis*). A resident in all the western states; Swainson's hawk (*Buteo swainsoni*) breeds throughout the west and winters in South America. Both are soaring hawks, inhabiting open country where visibility ranges for several miles. They soar for long periods of time, looking for mice, ground squirrels, reptiles and even grasshoppers. They may also be seen perched upon telephone poles in the desert regions of the west. A Swainson's hawk sighting was recorded during the Special Habitat Feature survey in the Mt. Hope site area during 1980 (Section 2.3).

Golden Eagle (*Aquila chrysaetos canadensis*). Found from northern Alaska in the Brooks Range, British Columbia, Mackenzie, northern Saskatchewan, northern Manitoba and Quebec, and the Gaspe Peninsula south to northern Baja California, Sonora, Sinaloa, Durango, Guanajuato, Nuevo Leon, west Texas (Brewster County), western Oklahoma, western Nebraska, western South Dakota, eastern Montana, northern Ontario across to New York, northern New Hampshire and Maine (A.O.U., 1957).

Heugly (1973) has estimated the minimum population of golden eagles in Nevada to be 1,833 birds, as based upon samples reported by other researches. The golden eagle is primarily a resident of mountainous areas and found mainly in the West. Heugly (1973) also places a conservative population estimate for golden eagles in North America between 50,000 and 100,000 birds. Recent estimates indicate a population of 35,000 golden eagles in the contiguous 48 states.

Golden eagles primarily feed upon small mammals, particularly rabbits and rodents. These two species may comprise from 70 percent to 98 percent by weight of an eagle's diet, depending on locality and prey availability (Brown and Amadon, 1968). Other food consists of carrion, recently fledged birds (Beecham, 1970) and sage grouse and pheasant (particularly during the breeding season).

Rare occasions of predation upon coyotes, pronghorn, mule deer, mallard ducks, bighorn sheep and domestic sheep and goats have been noted.

Golden eagles occupy definite territories, which include feeding, roosting, nesting and soaring-playing areas. The size of the territory depends to a certain extent on availability of food, nest sites and suitable terrain for flying (Kalmbach et al, 1964).

Golden eagles usually have a number of alternate nests, ranging from one to 14, although two to three alternate sites is the usual number (Kochert, 1973c; Murie, 1944; Camenzind, 1968, 1969; Hinman, 1960; Bent, 1937; D'Ostilio, 1954; Carnie, 1954; McGahan, 1966, 1968). The same nest may be used by a pair during consecutive nesting seasons, although they often repair alternate nests and visit them regularly until the eggs are laid (McGahan, 1968; Murie, 1944).

Most eagle eyries are located on cliffs, although in some situations three nests are not uncommon, Nests may be located on the ground and on cliffs as high as 400 feet (Beecham, 1970; Kochert, 1972; Carnie, 1954; Campbell, 1960; Camenzind, 1968, 1969; Bent, 1937; Page and Seibert, 1973; Brown and Amadon, 1968; Kalmbach et al, 1964). Nests have been located in

Douglas fir, cottonwood, ponderosa pine, sycamores, eucalyptus, redwoods, oaks and dead snages (McGahan, 1966; Bent, 1937). The height of tree nests may vary from 10 to 100 feet above the ground (Bent, 1937).

Elevations of active eyries have been recoreded at 5,000 to 8,500 feet in Elko County, Nevada (Page and Seibert, 1973). In Nevada, Page and Seibert (1972) reported that 43% of the nests they located faced east, 24% faced south, 21% faced west and 12% faced north. Human disturbance is by far the greatest reason for nest desertions. The adaptability of individual eagles in response to human activity varies, however, most birds appear to have a low tolerance to such pressures. Both the bald and golden eagles are protected under the Eagle Protection Act (the swainson's and ferruginous hawks are also species of State concern and are being considered as Candidate species).

Golden eagle utilization of the Mt. Hope area environ is concentrated as predation activity in Diamond Valley (U.S.D.I. 1983b). A Bureau of Land Management eagle survey of winter, 1983, indicated 2 observed golden eagles along western Diamond Valley and 10 observed golden eagles along eastern Diamond Valley. Type of prey available was recorded as black-tailed jackrabbits. Golden eagle nesting site potential within the proposed project area is considered low as elevation, prevalent winds and site positioning available (angles of exposure) indicated relatively minimal habitat value. There is one known golden eagle nest approximately one mile south of the Mt. Hope project area near State Route 278. In 1983, 13 golden eagle kills were recorded in the region (7 road kills, 6 electrocutions).

Waterfowl. Twenty-three species of waterfowl are known to migrate through the Battle Mountain BLM District. The occurrence of these species would be rare in the Mt. Hope area itself since there are no perennial lakes in the surrounding valleys, and the only perennial stream is a small spring-fed tributary of Henderson Creek which lies 2.8 miles northwest of Mt. Hope.

Within the waterfowl game resource areas of Nevada, spot checks conducted during a hunting season indicate that the top 10 species in declining order are pintail (Anas acuta), mallard (Anas pltyrhyncos), redhead (Aythya

americana), green-winged teal (Anas carolinensis), shoveler (Spatula chypeata), gadwall (Anas strepera), ruddy duck (Oxyura jamaicensis rubida), American widgeon (Mareca americana), canvas back (Aythya valisineria) and cinnamon teal (Anas cyanoptera) (HDR, 1980). All of these ducks have been sighted within the Battle Mountain BLM District and seven of the aforementioned species are "puddle ducks" (surface-feeding ducks commonly found on small ponds and streams, aminly nesting in marshy regions).

Within the Mt. Hope project site area and immediately surrounding vicinity, no ponds or wetland areas exist which would attract waterfowl. The site is, however, within the high plains portion of the Central Flyway and major waterfowl areas are known to the south, east and west. An estimated 100 to 500 waterfowl would be expected to utilize a pond of substantial size in the area during migration (D. Elliot, personal communication, 1983).

2.2.1.3 Fishes

Although Nevada is generally arid, the limited surface waters contain several fish species. Aquatic habitats capable of sustaining fish are limited primarily to springs and cold water perennial streams. Most of the streams are found in the mountains. Other habitats are ponds, reservoirs and a few lakes.

The Battle Mountain BLM District has reported 19 fish species as compiled from current literature and stream survey records. The 19 species include catfish, suckers, killifish, minnows, carp, pike, sunfish, trout and char. Twelve of the species have been introduced, while the remaining seven species are native, of which two are endemic.

Water sources in the Mt. Hope area are limited to three springs (one on-site seep, Mt. Hope spring intercepted for livestock watering, and McBrides Spring, also intercepted for livestock although overflow has resulted in a creek type environ and some ponding). There is no evidence of any habitat for vertebrate aquatic life, although it is possible that some invertebrate species may utilize these areas. However, known fish species exist in streams and other aquatic habitats of surrounding valleys. The

dominant species are shown in Table 2-7.

2.2.1.4 Reptiles and Amphibians

A list of the reptiles and amphibians within the Battle Mountain BLM District and a brief discussion of their habitat is shown in Table 2-8. The BLM has reported seven amphibian and 24 reptile species within the district. The list was compiled from sightings and records for the area and with the cooperation of the Nevada Department of Fish and Game. On-site investigations have been limited only to record of casual observations during site reconnaissance. Lizards are numerous; a single Great Basin Rattlesnake was observed at tailings pond Alternate 4-C.

2.3 Special Habitat Features

To supplement broad regional habitat descriptions and associated fauna characterizations, the BLM Battle Mountain District initiated a terrestrial wildlife habitat inventory of the Shoshone-Eureka Resource Area. Designed to provide baseline data for medium to long range resource management programs planning, the wildlife inventory emphasized identification and evaluation of "Special Habitat Features" (SHF).

All work associated with the SHF inventory was the direct result of Bureau Manual 6602-Integrated Habitat Inventory and Classification System (IHICS). This manual contains the basic framework for all terrestrial wildlife inventories the bureau has and will be conducting. The following outlines general study details as documented in the Bureau Manual.

All data requested in scientific nomenclature will be recorded in the standard four-letter abbreviations. The following sources were used:

1. Mammals, Amphibians, and Reptiles-Bureau Strategic Information System Listing as per Information Memo No. DSC 79-54 dated January 17, 1979. pp. 31-86.

Table 2-7 Dominant Fish Species Found in Streams and Other Aquataic Habitats Proximate to Mt. Hope

Location Stream	Length (mi)	Dominant Species
PINE VALLEY		
Denay Creek	3.1	Brook & Rainbow Trout
*Cottonwood Creek	2.0	Brook Trout
*Humboldt River	42	Channel catfish, black bullhead, Largemouth bass, Smallmouth bass, bluegill
GARDEN VALLEY		
Pete Hanson Creek	4.4	Brook & Rainbow Trout
Vinini Creek	6.0	Rainbow Trout
J. D. Reservoir	-	Northern Pike
DIAMOND VALLEY		
Shipley Warm Springs	-	Goldfish
Flynn Pond	-	Brown Bullhead
KOBEH VALLEY		
Roberts Creek	8.5	Brook, Rainbow & Brown Trout
ANTELOPE VALLEY		
Found in springs	-	Speckle Dace
Allison Creek	4.5	Brook Trout
N/2 MONITOR VALLEY		
Coils Creek	4.0	Rainbow Trout

*Lies outside of Battle Mountain BLM District.

Source: Data taken from Fishes of the Battle Mountain BLM District, U.S. Dept. of the Interior, Bureau of Land Management (1973), and the M-X ETR 16 on Aquatic Habitats and Biota, (1980).

Table 2-8 Reptiles and Amphibians of the Battle Mountain BLM District

AMPHIBIANS

Spadefoot Toads:

Great Basin Spadefoot - Scaphiopus intermontanus.
Habitat ranges from sagebrush flats to mountainous areas throughout the district.

True Toads:

Boreal Toad - Bufo boreas boreas.
Found in wet areas throughout the district.

Treefrogs:

Pacific Treefrog - Hyla regilla.
Chiefly a ground dweller, this frog is found around low plant growth near water.

True Frogs:

Spotted Frog - Rana pretiosa.
Found in springs, streams and ponds in the northern part of the district.

Red-legged Frog - Rana aurora.
Introduced into ponds on the Millett Ranch in Big Smoky Valley.

Leopard Frog - Rana pipiens.
This frog is found throughout Nevada where there is permanent water and cattails.

Bullfrog - Rana catesbeiana.
Due to the small amount of aquatic habitat, this species is uncommon to the district.

Table 2-8 Reptiles and Amphibians of the Battle Mountain BLM District (cont.)

REPTILES

Lizards

Iguanids:

Zebra-trailed Lizard - Callisaurus draconoides.
Found in desert washes in the southern portion of the district.

Collared Lizard - Crotaphytus collaris.
A rock-dwelling lizard found in canyons and rocky hillsides.

Long-nosed Leopard Lizard - Crotaphytus wislizenii wislizenii.
Inhabits low areas such a valley bottoms and avoids thickly vegetated areas.

Yellow-backed Spiny Lizard - Sceloporus magister uniformis.
Found in many areas from shadscale deserts to canyon bottoms, this species climbs rocks and trees and occasionally eats tree buds and leaves as well as insects.

Great Basin Fence Lizard - Sceloporus occidentalis biseriatus.
One of the most common western lizards found throughout the district in wooded and rocky places, around old buildings, woodpiles an fences.

Northern Sagebrush Lizard - Sceloporus graciosus graciosus.
A ground dweller, usually found in high altitudes near bushes, logs, rocks or brush heaps.

Table 2-8 Reptiles and Amphibians of the Battle Mountain BLM District (cont.)

Northern Side-blotched Lizard - Uta stansburiana stansburiana.
A daylight dweller, this species is very heat tolerant and is usually found in a habitat of loose sand and scattered bushes and trees.

Northern Desert Horned Lizard - Phrynosoma platyrhinos platyrhinos.
The most widespread horned lizard in the district, commonly called "horny toad." Found near shadscale, greasewood, sage and sandy areas.

Skinks:

Great Basin Skink - Eumeces skiltonianus utahensisl.
Found throughout the district in grassland, woodland and forests, under logs, bark, rocks and other surface objects near streams, and sometimes on dry hillsides far from water.

Whiptails:

Great Basin Whiptail - Cnemidophorus tigris tigris.
An active species found throughout Nevada in arid and semi-arid habitats near gravelly washes and in rocky places near sagebrush, grassland and brushy foothill areas.

Snakes

Boas:

Rocky Mountain Rubber Boa - Charina bottae utahensis.
A good swimmer, burrower and climber, this species is found near grasslands, woodlands and forests in and beneath rotting logs. A rocky stream with banks of sand or loam in a coniferous forest is a favorable habitat.

Table 2-8 Reptiles and Amphibians of the Battle Mountain BLM District (cont.)

Colubrids:

Western Yellow-bellied Racer - Coluber constrictor mormon.
Found in the northern portion of the district, this snake favors open habitats of meadows and thin brush. It lives in semi-arid and moist environments and avoids extremely dry areas and high mountains.

Red Racer Coachwhip - Masticophis flagellum piceus.
Found in the southern portion of the district, this snake, noted for its speed, avoids dense vegetation and tolerates dry conditions.

Desert Striped Whipsnake - Masticophis taeniatus taeniatus.
An alert, fast-moving snake, active during the daylight hours, and found in most areas of the district near brushlands, grasslands, sagebrush flats and pinyon-juniper in elevations to 9,400 feet.

Mohave Patch-nosed Snake - Salvadora hexalepis mojavensis.
A very fast snake, found in the southern portion of the district.

Great Basin Gopher Snake - Pituophis melanoleucus deserticola.
The most common snake in this area, it occupies a great variety of habitats, especially cultivated fields, grass or brush. Widespread throughout the district and the entire state of Nevada.

California Kingsnake - Lampropeltis getulus.
Found throughout most of the district in rocky canyons which have good vegetative cover. This snake is well thought of because part of its diet is other snakes.

Table 2-8 Reptiles and Amphibians of the Battle Mountain BLM District (cont.)

Western Long-nosed Snake - Rhinocheilus lecontei lecontei.
This snake is found throughout most of the district in valleys and foothills, but is seldom seen in the mountains. A good burrower, it spends its daylight hours underground.

Wandering Garter Snake - Thamnophis elegans vagrans.
This snake has a variety of habitats from sea level to high mountains. It is often found in damp environments near water.

Western Ground Snake - Sonora semiannulata.
This species is located along the northern edge of the district near sandy hillsides or flats, with or without rocks. Usually found under rocks or in sandy ridges to an elevation of 6,000 feet.

Nevada Shovel-nosed Snake - Chionactis occipitalis.
Found in the extreme southern portion of the district in dry, sandy areas, this species burrows into the sand for daytime protection and hunts insects at night.

Desert Night Snake - Hypsiglena torquata deserticola.
Found throughout most of the district, this snake's habitat consists mainly of sagebrush flats, deserts and lower slopes of mountains in both rocky and sandy areas. A nocturnal prowler feeding on lizards and frogs, it kills prey by injecting venom from rear enlarged grooved teeth of the upper jaw.

Vipers:

Great Basin Rattlesnake - Crotalus viridis lutosus.
Found in a variety of habitats in many locations throughout the district.

Table 2-8 Reptiles and Amphibians of the Battle Mountain BLM District (cont.)

Panamint Rattlesnake - Crotalus mitchelli stephensi.
Found in the extreme southern part of the district. Rough scales and salt and pepper speckling of this snake resembles the color of decomposed granite.

Source: Nevada Dept. of Fish and Game, BLM.

2. North American Bird Codes-Bureau Strategic Information System Listing as per Information Memo No. DSC 79-54 dated January 17, 1979. pp. 98-127.

A special habitat feature (SHF) is defined as an anomaly or area within or adjacent to a larger habitat site which influences faunal population, movements or distribution, SHF sites were characterized as man-made or naturally occurring. Evaluation of SHF sites by the BLM extended to aerial observation and selected ground-proofing (field observations) of data. Table 2-9 lists the SHF codes corresponding to natural and man-made features. Table 2-10 lists species considered to be characteristic of special habitat feature types, based upon actual observation and ground proofing in the Shoshone-Eureka Resource Area.

The BLM has noted that certain limitations exist when using this information: "First, not all SHFs have been found in the Mt. Hope area. Second, the identification and delineation of some of the SHFs that have been found can be improved since much of the mapping was done from a helicopter. Third, the species lists are valid on a regional basis and therefore all of the species may not be found in the Mt. Hope area. Finally, the ground work was completed mainly during daylight hours in the spring and summer and no trapping was done. Therefore, the species lists are far from complete and weighted in favor of nesting birds." (Letter correspondence from Neil Talbot, BLM, dated February 24, 1983).

The Mt. Hope site area was included in the SHF site evaluation studies conducted from October, 1979 to November, 1980. Within the Mt. Hope site boundaries a total of 16 SHF sites were identified (Figure 2-7). An additional 14 SHF sites were identified offsite within a 1.5 mile (2.4 km) perimeter zone. Of the 30 onsite and perimeter zone SHF sites, 19 were characterized as man-made features. Five of sixteen SHF sites within the Mt. Hope site boundary were considered to be naturally occurring; all of which involved rock or boulder outcroppings (e.g., solitary cliff including crags). Man-made features within the Mt. Hope site coundaries and considered potentially habitat influential included building structures, mining activity areas, transmission line poles, inactive railroad line structure, pipeline, material

Table 2-9 Special Habitat Feature (SHF) Codes

Natural Features	Man-Made Special Features
A02 - Cave (all)	B01 - Bridge
A05 - Cliff (and bluffs)	B02 - Fence
A06 - Cone, Volcanic	B04 - Salting Area
A08 - Dune, SAnd	B05 - Goose Nesting Platforms
A10 - Overhand	B06 - Artificial Nesting Boxes
A11 - Salting Area	B07 - Small Seedings
A12 - Seep	B08 - Buffer Strip
A13 - Cold Spring	B09 - Building
A15 - Snag or Group of Snags	B10 - Bird Ramp
A16 - Talus, Slope	B11 - Berm
A19 - Waterfall	B12 - Culvert
A23 - Down Timber	B15 - Exclosure, Study Area
A25 - Beaver Dam	B16 - Fish Migration Barrier (Man-caused)
A29 - Hot Springs	B17 - Gauging Station, Water
A30 - Blowouts	B18 - Mining Activity
A32 - Temporary Pond	B19 - Poles (Electrical and Telephone)
A33 - Small Natural Ponds	B20 - Perches
A34 - Small Group of Trees or Shrubs	B21 - Road
(Non-riparian)	B22 - Trail
A35 - Small Group of Trees or Shrubs	B23 - Stream Improvement Structure
(Riparian)	B24 - Railroad
A36 - Small Dry Meadow	B25 - Stream Crossing
(less than 2 acres)	B26 - Shelter (overnight)
A39 - Raptor Nest Tree	B27 - Recreation Area
A41 - Rock or Boulder Outcrop	B28 - Feeding Station
(solitary cliff, incl. crag)	B30 - Seismographic Trail
A42 - Rodent colony	B32 - Windmill
A43 - Beaver Lodge	B33 - Irrigation Diversion & Ditch
A49 - Gravel Bar	B34 - Water Gap
(more than 1.0 mm in dia.)	B35 - Stock Water Ponds
A50 - Sand Bar	B36 - Corral & Loading Chute
(less than 1.0 mm in dia.)	B37 - Artificial Wildlife Waters
B55 - Barren	B38 - Domestic Water source
A56 - Burn	B39 - Artesian Well
A57 - Booming or Strutting Ground	B42 - Pipeline
A58 - Small Wet Meadow	B43 - Material Site
(less than 2 acres)	B44 - Air Field
	B46 - Dam
	B49 - Burn
	B50 - Mine Shafts
	B51 - Mine "tunnel" (open at one or two ends)
	B52 - Stock Water Tank
	B53 - Disposal Site (active)
	B54 - Disposal Site (Inactive)
	B56 - Abandoned Homesite
	B57 - Relay Station (Radio Tower microwave)
	B59 - Brush Pile/Row

Table 2-10 List of Animal Species Observed While Ground Proofing Special Habitat Features, Battle Mountain BLM District, November, 1980

Mammal Species	Special Habitat Feature
Mule Deer	B52, A58, B35, B38, A41, B32, A13, A35, B42, B15, A34, A36
Beldings Ground Squirrel	B52, B35, A13
Black-Tailed Jackrabbit	B52, B43, A58, B38, B35, A41, B32, A13, A32, B53, B15, B09, A29
Coyote	B52, A58, B35, B09, A41, B37, A05, A13, A12
Desert Cottontail	B43, B53
Mountain Cottontail	A41, A13, A12, A35
Cliff Chipmunk	A41
Least Chipmunk	B35, A41, A05, A13
Bushy-Tailed Woodrat	B09, A41, A05, A13
Long-Tailed Weasel	A35
Spotted Skunk	A13
Yellow-Bellied Marmot	A41
Deer Mouse	B09
Golden-Mantled Ground Squirrel	A41, A05, A13, A12, A35
Western Meadowlark	B52, A58, B38, B37, A13, B15, B35, A12
Mountain Bluebird	B52, B35, A35
Barn Swallow	B52, B35
Cliff Swallow	B52, B09
Violet-Green Swallow	B35, A34, A35
Tree Swallow	A41
Rough-Winged Swallow	B35
Vesper Sparrow	B52, B27, A13, A35

Table 2-10 List of Animal Species Observed While Ground Proofing Special Habitat Features, Battle Mountain BLM District, November, 1980 (cont.)

Bird Species	Special Habitat Feature
Sage Sparrow	B52, A58, B35, B38, A13
Brewer's Sparrow	A58, A33, B15, B39
Chipping Sparrow	B35, A41, A13, A35
Song Sparrow	B36, A35
Savannah Sparrow	A13
Grasshopper Sparrow	A13
White-Crowned Sparrow	A35, A13
Fox Sparrow	A35, A12
Lark Sparrow	B15
Starling	A58
Red-Winged Blackbird	A58, A13, A33, B39
Brewer's Blackbird	A58, B35, B37, A13, A33, A35, A29
Yellow-Headed Blackbird	A13
Brown-Headed Cowbird	A58, B35, A13, A34
Bullock's Oriole	A35
Sage Thrasher	B52, A58, B35, B38, B36, A41, A13, A12, B53, A33, B15, A35
Hermit Thrush	A13, A35
Swainson's Thrush	A35
Robin	B52, B35, A41, A13, A35, A12, A34, A35
Green-Tailed Towhee	B52, B35, A13, A35, A12, A34, A35
Rufous-Sided Towhee	A58, A13, A35, A12
Gray-Headed Junco	A13, A35

Table 2-10 List of Animal Species Observed While Ground Proofing Special Habitat Features, Battle Mountain BLM District, November, 1980 (cont.)

Bird Species	Special Habitat Feature
Oregon Junco	A35
Lazuli Bunting	A35, A13
Horned Lark	B52, B43, A58, B38, A13, A32, A36, B35
Killdeer	A58, B35, B37, A13, A33, B38, A29
Wilson's Phalarope	A58, A13, A32, A33
Willet	A58, A13, A32, A33
Avocet	A58, A13, A32, A33
Pintail	A58, B35, A13, A32, A33, B39
Mallard	A58, B35, A13, A32, A33
Green-Winged Teal	A13
Spotted Sandpiper	B35
Common Snipe	B37, A13
Solitary Sandpiper	A13
Mourning Dove	A58, B36, A41, A13, A35, A12, A33, A34 A36, B19, B43, B35, B09, B57
Band-Tailed Pigeon	A34
Sage Grouse	B36, A13, A35, A12, B15, B57
Chukar Partridge	A41, B37, A05, A13, A35, A34, B35, A12
Blue Grouse	A34
Valley Quail	A13, A35
Red-Tailed Hawk	B35, A41, A35
American Kestrel	B09, A41, B15, A35
Prairie Falcon	A41, A05, A35, B19

Table 2-10 List of Animal Species Observed While Ground Proofing Special Habitat Features, Battle Mountain BLM District, November, 1980 (cont.)

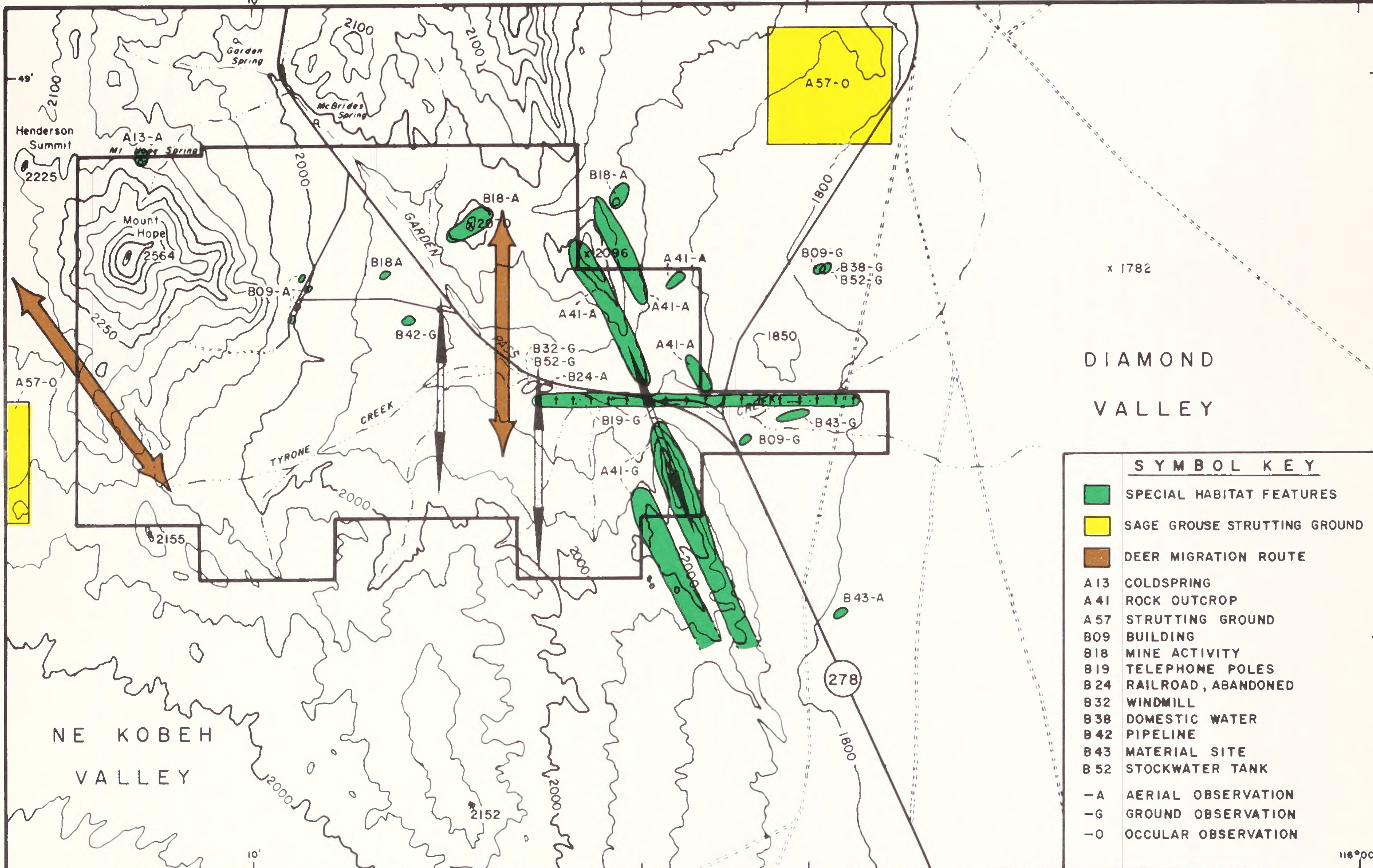
Bird Species	Special Habitat Feature
Golden Eagle	A41, A05, B19
Marsh Hawk	A13, B15
Sharp-Shinned Hawk	A15, A35
Cooper's Hawk	A34, A35, A13
Swainson's Hawk	B19
Short-Eared Owl	A35
Long-Eared Owl	A35
Loggerhead Shrike	B15, A13
Clark's Nutcracker	A41, A35
Raven	A41, B32, A13, A05, B19
Common Crow	A05, B32, B57, B19
Pinyon Jay	A41, A13
Scrub Jay	A41, A13, A35
Black-Billed Magpie	B37, A13, A35, A41, A05
Red-Shafted Flicker	A05, A35, A34
Downy Woodpecker	A35
Hairy Woodpecker	A35
Yellow-Bellied Sapsucker	A35, A34
Western Tananger	B35, A35
Gray Flycatcher	A58
Traill's Flycatcher	A13
Western Flycatcher	A35
Dusky Flycatcher	A35, A34

Table 2-10 List of Animal Species Observed While Ground Proofing Special Habitat Features, Battle Mountain BLM District, November, 1980 (cont.)

Bird Species	Special Habitat Feature
Western Kingbird	B09, A35
Says Phoebe	A41, A13, A34
Brown Creeper	A13, A35
Plain Titmouse	A12
Water Pipit	A12
Ruby-Crowned Kinglet	A35
Golden-Crowned Kinglet	A35
Yellow-Brested Chat	A35
Solitary Vireo	A35
Warbling Vireo	A35, A34
Bushtit	B35, A35, A13
Mountain Chickadee	B35, A13, A35, A34, A12
White-Breasted Nathatch	B36, A13
Rock Wren	A41, B18, B09, A05, A12
Canyon Wren	A41, A05
House Wren	A13, A35
Poorwill	A41
Common Nighthawk	A35
Cassin's Finch	A13, A35
Broad-Tailed Hummingbird	A13, A35
Western Wood Pewee	A35
Townsend's Solitaire	A35
Yellow Warbler	A13, A35, A33, B36

Table 2-10 List of Animal Species Observed While Ground Proofing Special Habitat Features, Battle Mountain BLM District, November, 1980 (cont.)

Bird Species	Special Habitat Feature
MacGillivrays' Warbler	A13, A35, A34
Yellow-Rumped Warbler	A13, A35
Black-Throated Gray Warabler	A13, A35
Townsend's Warbler	A13
Reptile & Amphibian Species	
Northern Sagebrush Lizard	B43, B09, A41, A05, B18, B53
Yellow-Backed Spiny Lizard	B09, B18, A41
Northern Side-Blotched Lizard	A41, A13
Great Basin Fence Lizard	A41, B18, B09, A05, A12, B57
Northern Desert Horned Lizard	A41
Leopard Frog	A13
Collared Lizard	A41
Great Basin Spadefoot Toad	A12
Great Basin Rattlesnake	A41, B53
Western Yellow-Bellied Racer	A35
Great Basin Gopher Snake	A13, B15, A58
Wandering Garter Snake	A13, A35
Desert Striped Whipsnake	A13, A35



LEGEND

- EPHEMERAL STREAM
- x 2155 SPOT ELEVATION
- 50 METER CONTOUR
- 250 METER CONTOUR
- STATE ROUTE
- PROPOSED PROJECT BOUNDARY

NOTE: SHF'S NOT NECESSARILY DRAWN TO EXACT SCALE.

NEVADA MAP AREA

CONTOUR INTERVAL 50 METERS (164 FT.)

0 1/2 1 2 MILES

0 1/2 1 2 3 KM

N

BASE: MODIFIED USGS TOPO QUADRANGLES, GARDEN VALLEY & WHISTLER MTN., NEVADA.

MT. HOPE MOLYBDENUM PROJECT

SPECIAL HABITAT FEATURES

U.S. Department of the Interior
Bureau of Land Management

FIGURE 2-7

sites, windmill and stock water tank. Table 2-11 lists the fauna observed by the BLM at onsite SHF sites.

Offsite natural SHF areas included sage grouse strutting grounds (2), rock or boulder outcrops, a small group of riparian trees and/or shrubs and cold water springs (2). In addition to the man-made SHF types noted onsite, offsite SHF areas included stock water ponds (one group) and an adjacent domestic water source.

Review of available data (regional and site-specific) does not indicate that particularly significant wildlife habitats exist within the Mt. Hope site boundaries.

Due to localized management goals concerning related area environment utilization (e.g., BLM-range management, wilderness area; NFWS-species protection, hunting), some species inhabiting or frequenting the proposed project area and vicinity have been denoted by the BLM as being of special interest. Fauna and related habitat use of special interest in the Mt. Hope area include mule deer (migratory routing), golden eagle (raptor nesting potential), sage grouse (strutting grounds), wild horses (grazing utilization) and prairie falcon (population status). Comments addressing these species habitations in the Mt. Hope area may be found under the discussion of each respective species in section 2.2.1.1 or 2.2.1.2.

Of particular note regarding species of interest, the proposed highway relocation would come within 1.0 mi. (1.6 km) of the sage grouse strutting ground to the northeast of Mt. Hope. The northwest border of alternative tailings pond Alternate 4-C is approximately 0.75 mi. (1.2 km) south of a SHF A-57 (sage grouse strutting ground) located southwest of Mt. Hope. The northwest border of alternative tailings pond Alternate 4-B is 1.0 mi. (1.6 km) from a sage grouse strutting ground to the northeast of Mt. Hope.

The proposed powerline route 2-A would come within 0.6 mi. (0.97 km) of a sage grouse strutting ground in Diamond Valley. Alternative power line route 2-B would traverse two sage grouse strutting grounds which are located southeast of Mt. Hope in Diamond Valley. Alternative power line

Table 2-11 Mt. Hope Special Habitat Features Site Inventory Data

SHF Type	(Code)	Site Description (Site No.)	Species Observed
Outcrops	A41	Outcrops two Ridges Big Sage juniper (G)*	Western Fence Lizard, Mourning Dove, Rock Wren, Common Raven, Coyote, Yellow-bellied Marmot
Building	B09	Building (G)	None
Material Site	B43	Material Site, Big Sage (G)	None
Powerline	B19	Poles (G)	Mourning Dive, Swainson's Hawk
Windmill	B32	Windmill with 3 tanks Big Sagebrush	Black-Tailed Jackrabbit, Mule Deer
	B52	Windmill with 3 tanks Big	Sage Thrasher, Black-tailed Jackrabbit, Mule Deer
Domestic Water Source	B38	Capped well with trough, two buildings	Horned Lark, Deer Mouse, Black-tailed Jackrabbit
Building	B09	Two buildings, one with foundation only (G)	None
Trough	B52	Trough with capped well two buildings (G)	Horned Lark, Cliff Swallow, Black-Tailed Jackrabbit

* G code indicates groundproofing activity.

route 2-C would traverse the two sage grouse strutting grounds previously mentioned for route 2-B.

The proposed routing for the Kobeh Valley water line corridor 3-A and the alternative water line corridor 3-B would be located 1.7 mi. (2.7 km) to the east of two sage grouse strutting grounds in Kobeh Valley. Alternative water line corridor 3-C would traverse a sage grouse strutting ground to the immediate southwest of Mt. Hope. This strutting ground covers an area of approximately 768 acres. It also would traverse one strutting ground and potentially traverse or approach within 0.5 mi. (0.8 km) two strutting grounds, all within Kobeh Valley.

2.4 Protected Species

The presence or potential of onsite or near proximity occurrence of rare, endangered or threatened fauna and flora are especially important to a project impact evaluation.

Protected species can be divided into six functional categories of protection or other regulation under state and federal laws. These categories are (1) federally listed threatened and endangered (protected under the Endangered Species Act of 1973 and amendments), (2) state listed threatened and endangered (proected by state laws), (3) federally protected (under other federal laws), (4) state-protected (under other state laws), (5) game and furbearing, and (6) unprotected but rare.

The Endangered Species Act of 1973 defines federally listed endangered species as those in danger of extinction throughout all or a significant portion of their world range; federally listed threatened species are those likely to become endangered in the foreseeable future.

The State of Nevada has an analogous definition for species in danger of extinction within the state, but not necessarily throughout their entire range. These are the state-listed endangered and threatened species. For Nevada, state-listed plant species are those declared by the state forester fire warden to be threatened with extinction under NRS 527.270. Federally

protected animals are those protected by federal law, such as wild horses and burros. State-protected animal species are those that cannot be hunted, captured, or possessed at any time. State-protected plant species include: "any tree, shrub, plant, fern, wildflower, cacti, desert or montane flora, or any seeds, roots, or bulbs or either or any of the foregoing; all cacti, yucca, and evergreen grees; and of any flora declared endangered by the state forester fire-warden." These cannot be removed or destroyed without permission from any private, state, or federal lands (Nevada Revised Statutes, 1973, Section 527.050 and 527.707). Game animals and furbearers may be hunted or captured during specified seasons in specified ways, or only in certain regions. All other animal species have no protection under state laws. The term "species of special concern" was coined by the Northern Nevada Native Plant Society (NNNPS, 1980) to include rare plant species that cannot be regarded as either endangered or threatened but which, because of their rarity, limited range or uncertain future, must be considered in planning. Species that are recommended to be delisted consist of species that were erroneously listed in the first place and are not known to occur in Nevada or Utah; species that are no longer considered to be valid; or species that have been found to be more abundant and widespread since their original listing and are now considered not to warrant sensitive status (NNNPS, 1980; Welsh and Thorne, 1979).

2.4.1 Protected Flora

Table 2-12 lists threatened and endangered plants for Nevada as designated in the Federal Register, Vol. 45, No. 242, December 15, 1980.

No federal or state listed or proposed rare, endangered or threatened (RET) species are known to exist within the proposed project boundaries or perimeter zone (1.5 mi, 2.5 km). Twenty-six plant species occurring in the Battle Mountain District were published (45 FR 242) on December 15, 1980 as candidate species. Table 2-13 shows four of these floral species known to occur in Eureka County (Mozingo and Williams, 1980). They are discussed below. It should be noted, however, that the Northern Nevada Native Plant Society (NNNPS) recommended in 1981 that 22 species be dropped from consideration as threatened or endangered, including the four species occurring in Eureka

Table 2-12 Threatened and Endangered Plants for Nevada as Listed in the Federal Register, Vol. 45 No. 242, December 15, 1980

Cat.	Taxon	Family	Common Name	Historic Distribution
		Taxa Currently Listed		
1	Astragalus Yoder-WilliamsII	Fabaceae	Milk-Vetch, Osgood Mnts.	ID NV - Winnemucca Dist.
		Taxa Currently Under Review - Nevada Sensitive Species		
Cat.	Taxon	Family	Common Name	Historic Distribution
2	Agave utahensis Var. eborispina	Liliaceae		CA NV
2	Agave utahensis Var. nevadensis	Liliaceae		CA NV
1	Angelica scabrida	Aspiaceae		NV
2	Antennaria arcuata	Asteraceae	Pussytoes, Meadow	ID NV WY
1	Antennaria soliceps	Asteraceae		NV
*1	Arctomecon californica	Papaveraceae	Desert-Poppy	AZ NV
2	Arctomecon merriamii	Papaveraceae	Desert-Poppy	CA NV
1	Arenaria kingii Var. rosea	Caryophyllaceae		NV
*1	Arenaria stenomeres	Caryophyllaceae		NV
2	Asclepias eastwoodiana	Asclepiadaceae	Milkweed, Eastwood's	NV
2	Astragalus ackermanii	Fabaceae		NV
1	Astragalus aequalis	Fabaceae		NV
*1	Astragalus beatleyae	Fabaceae	Milk-Vetch, Beatley	NV
1	Astragalus callithrix	Fabaceae	Milk-Vetch, Calloway	NV UT
1	Astragalus calycosus Var. monophyllidius	Fabaceae	Milk-Vetch, One Leaflet Torrey	NV
2	Astragalus cimae Var. cimae	Fabaceae	Rattleweed, Cima	CA NV
1	Astragalus funereus	Fabaceae		CA NV
*1	Astragalus geyeri Var. triguetrus	Fabaceae		AZ NV
2	Astragalus lentiginosus Var. latus	Fabaceae		NV
*1	Astragalus lentiginosus Var. micans	Fabaceae		CA NV

Table 2-12 Threatened and Endangered Plants for Nevada as Listed in the Federal Register, Vol. 45 No. 242, December 15, 1980 (cont.)

	Taxa Currently Listed			
Cat.	Taxon	Family	Common Name	Historic Distribution
1	Astragalus lentiginosus Var. sesquimetralis	Fabaceae		CA NV
1	Astragalus mohavensis Var. hemigymus	Fabaceae		CA NV
2	Astragalus musimonum	Fabaceae		NV
1	Astragalus oophorus Var. clokeyanus	Fabaceae		NV
*1	Astragalus phoenix	Fabaceae	Milk-Vetch, Ash Meadows	NV
1	Astragalus porrectus	Fabaceae	Milk-Vetch	NV
2	Astragalus pseudiodanthus	Fabaceae		CA NV
2	Astragakys pterocarpus	Fabaceae		NV
1	Astragalus robbinsii Var. occidentalis	Fabaceae	Milk-Vetch, Robbins	NV
1	Astragalus sereno Var. cordescens	Fabaceae	Milk-Vetch	NV
2	Astragalus solitarius	Fabaceae		NV OR
2	Astragalus tephrodes Var. eurylobus	Fabaceae		NV
1	Astragalus toquimanus	Fabaceae		NV
1	Astragalus uncialis	Fabaceae	Milk-Vetch	NV
1	Brickellia knappiana	Asteraceae	Brickellia, Knapp's	CA NV
1	Calochortus striatyus	Liliaceae	Mariposa, Alkali	CA NV
2	Camissonia megalantha	Onagraceae		AZ NV UT
2	Camissonia nevadensis	Onagraceae		NV
*1	Castilleja salsuginosa	Scrophulariaceae	Indian Paintbrush	NV
1	Centaurium namophilum Var. namophilum/ined.	Gentianaceae		CA NV
2	Cordylanthus tecopensis	Scrophulariaceae	Bird's-Beak, Tecopa	CA NV
2	Caryphantha vivipara Var. rosea	Cactacteae		AZ CA NV UT
4	Cryptantha hoffmannii	Boraginaceae		CA NV
1	Cryptantha insolita	Boraginaceae	Catseye	NV
1	Cryptantha tumulosa	Boraginaceae		CA NV

Table 2-12 Threatened and Endangered Plants for Nevada as Listed in the Federal Register, Vol. 45 No. 242, December 15, 1980 (cont.)

	Taxa Currently Listed			
Cat.	Taxon	Family	Common Name	Historic Distribution
2	Cymopterus basalticus	Apiaceae		NV UT
1	Cymopterus goodrichii	Apicaeae		NV
2	Cymopterus nivalis	Apicaeae		ID MT NV
2	Cymopterus ripleyi Var.	Apiaceae		NV
2	draba arida	Brassicaceae		NV
2	Draba asterophora Var. asterophora	Brassicaceae	Draba, Lake Tahoe	CA NV
1	Draba crassifolia Var. nevadensis	Brassicaceae		CA NV
2	Draba douglasii Var. crockeri	Brassicaceae		CA NV
1	Draba Jaegeri	Brassicaceae		NV
1	Draba paucifructa	Brassicaceae		NV
2	Draba quadricostata	Brassicaceae	Draba, Bodie Hills	CA NV
2	Draba stenoloba Var. ramosa	Brassicaceae		CA NV
1	Elodea nevadensis	Hydrocharitaceae	Waterweed, Nevada	NV
1	Enceliopsis nudicaulis Var. corrugata	Asteraceae		NV
1	Epilobium nevadense	Onagraceae	Willowherb, Nevada	NV UT
1	Erigeon latus	Asteraceae	Fleabane	ID NV
2	Erigeron ovinus	Asteraceae		NV
2	Erigeron uncialis Var. conjungans	Asteraceae		NV
1	Eriogonum ammophilum	Polygonaceae	Wild Buckwheat, Sand-Loving	NV UT
*1	Eriogonum argophyllum	Polygonaceae	Wild Buckwheat	NV
2	Eriogonum bifurcatum	Polygonaceae		CA NV
1	Eriogonum holmgrenii	Polygonaceae		NV
*1	Eriogonum lemmonii	Polygonaceae	Wild Buckwheat	NV
1	Eriogonum lobbii Var. robustum	Polygonaceae		NV
1	Eriogonum ovalifolium Var. nov. ined.	Polygonaceae		NV

Table 2-12 Threatened and Endangered Plants for Nevada as Listed in the Federal Register, Vol. 45 No. 242, December 15, 1980 (cont.)

Taxa Currently Listed				
Cat.	Taxon	Family	Common Name	Historic Distribution
*2	Eriogonum viscidulum	Polygonaceae	Wild Buckwheat	AZ NV
2	Ferocactus acanthodes Var. acanthodes	Cactaceae		AZ CA NV
2	Forsellesia pungens Var.	Crossosomataceae		CA NV
*1	frasera gypsicola	Gentianaceae	Green-Fentian	NV
1	Frasera pahutensis	Gentianaceae	Green-Gentian	NV
2	Fraxinus cuspidata Var. macropetala	Oleaceae	Ash.	AZ NV NM
1	Galium hilendiae SSP. king-stonense	Rubiaceae	Bedstraw, Kingston	CA NV
2	Gilia nyensis	polemoniaceae		NV
1	Grindelia fraxino-pratensis	Asteraceae		CA NV
1	Hackel ophiobia	Boraginaceae	Stickseed	NV OR
2	Haplopappus alpinus	Asteraceae		NV
1	Ivesia cryptocaulis	Rosaceae		NV
1	Ivesia eremica	Rosaceae		NV
*1	Lathyrus hitchcockianus	Fabaceae	Peavine, Hitchcock's	CA NV
2	Lepidium nanum	Brassicaceae		NV
2	Lesquerella hitchcockii	Brassicaceae	Bladderpod	NV
1	Lewisia maquirei	Portulacacae		NV
2	Lupthus malacophyllus	Fabaceae		NV
*1	Mentzelia leucophylla	Loasaceae	Stickleaf, Ash Meadows	NV
2	Mertensia toyabensis	Boraginaceae	Bluebells	NV
2	Opuntia whipplei Var. multigeniculata	Cactaceae		AZ NV UT
2	Oryctes nevadensis	Solanaceae		CA ID NV
1	Oxytheca watsonii	Polygonaceae		NV
1	Penstemon arenarius	Scrophulariaceae		NV
1	Penstemon bicolor Ssp. bicolor	Scrophulariaceae		NV
1	Penstemon bicolor Ssp. roseus	Scrophulariaceae		AZ NV
1	Penstemon francisci-pennellii	Scrophulariaceae		NV

Table 2-12 Threatened and Endangered Plants for Nevada as Listed in the Federal Register, Vol. 45 No. 242, December 15, 1980 (cont.)

	Taxa Currently Listed			
Cat.	Taxon	Family	Common Name	Historic Distribution
1	Penstemon fruticiformix Ssp. amargosae	Scrophulariaceae		CA NV
2	Penstemon keckii	Scrophulariaceae	Beardtongue	NV
2	Penstemon moriahensis	Scrophulariaceae		NV
1	Penstemon pahutensis	Scrophulariaceae	Beardtongue	NV
1	Penstemon procerus Var. modestus	Scrophulariaceae		NV
1	Penstemon pudicus	Scrophulariaceae		NV
2	Penstemon rubicundus	Scrophulariaceae	Beardtongue	NV
2	Penstemon thompsoniae Ssp. jaegeri	Scrophulariaceae		NV
2	Perityle megalocephala Var. inricata	Asteraceae		CA NV
2	Phacelia anelsonii	Hydrophyllaceae	Phacelia, Macbride	CA NV UT
1	Phacelia beatleyae	Hydrophyllaceae	Phacelia, Beatley	NV
1	Phacelia glaberrima	Hydrophyllaceae		NV
*1	Phacelia inconspicua	Hydrophyllaceae		ID NV
2	Phacelia nevadensis	Hydrophyllaceae		NV
2	Phacelia parishii	Hydrophyllaceae		CA NV
2	Phlox gladiformis	Polemoniaceae	Phlox, Red Canyon	NV UT
2	Polygala subspinosa Var. heterorhynca	Polygalaceae		CA NV
*1	Primula capillaris	Primulaceae	Primrose	NV
1	Primula nevadensis	Primulaceae	Primrose	NV
1	Rorippa subumbellata	Brassicaceae		CA NV
1	Sclerocactus polyancistrus	Cactaceae	Fishhook Cactus, Mohave	AZ CA NV UT
1	Sclerocactus pubispinus	Cactaceae	Fishhook Cactus, Great Basin	NV UT
2	Selaginella utahensis	Selaginellaceae		NV UT
1	Silene clokeyi	Caryophyllaceae		NV
1	Sphaeralcea caespitosa	Malyaceae	Globe-Mallow, Jones	NV UT
1	Sphaeromeria compacta	Asteraceae	Tansy	NV

Table 2-12 Threatened and Endangered Plants for Nevada as Listed in the Federal Register, Vol. 45 No. 242, December 15, 1980 (cont.)

Taxa Currently Listed

Cat.	Taxon	Family	Common Name	Historic Distribution
1	Streptanthus oliganthus	Brassicaceae	Streptanthus, Masonic Mtn.	CA NV
1	Synthyris ranunculina	Scrophulariaceae	Kittentails	NV
2	Thelypodium sagittatum Var. ovalifolium	Brassicaceae		NV UT
1	Townsendia jonesii Var. temulosa	Asteraceae		NV
2	Townsendia sp./sp. nov. ined.	Asteraceae	Townsendia (Nye Co. NV)	NV
2	Trifolium andersonii Ssp. beatleyae	Fabaceae	Clover, Five-Leaf Beatley's	CA NV
1	Trifolium lemmonii	Fabaceae	Clover, Lemmon's	CA NV
1	Viola purpurea Var. charlestonensis	Violaceae	Violet, limestone	NV UT
2	Zigadenus vaginatus	Liliaceae	Deathcamus, sheathed	NV UT

Taxa No Longer Under Review

Cat.	Taxon	Family	Common Name	Historic Distribution
3B	Abronia orbiculata	Nyctaginaceae		NV
3C	Arabis dispar	Brassicaceae	Rock cress	CA NV
3C	Arabis shockleyi	Brassicaceae	Rock Cress, Shockley's CA	NV UT
3C	Artemisia papposa	Asteraceae		ID NV OR
3C	Astragalus alvordensis	Fabadeae		NV OR
3C	Astragalus nyensis	Fabaceae	Milk-Vetch	NV
3C	Carex micropters Var. crassinervia	Cyperaceae	Sedge, small-livings	CO MT NV WY
3B	Castilleja linoides	Scrophulariaceae		NV
3C	Cirsium clokeyi	Asteraceae	Thistle, Clokey's NV	
3C	Cryptantha interrupta	Boraginaceae		ID MT NV OR 3C
3C	Cymopterus corrugatus	Apiaceae		ID NV OR
3B	Ditaxis diversiflora	Emphorbiaceae		NV
3C	Driba douglasii Var. douglasii	Brassicaceace	CA ID NV OR WA	

Table 2-12 Threatened and Endangered Plants for Nevada as Listed in the Federal Register, Vol. 45 No. 242, December 15, 1980 (cont.)

		Taxa Currently Listed		
Cat.	Taxon	Family	Common Name	Historic Distribution
3C	Draba sphaeroides Var. cusickii	Brassicaceae	NV OR UT	
3C	Ephedra funerea	Ephedraceae		CA NV
3C	Eriogonum anemophilum	Polygonaceae	Wild Buckwheat	NV
3C	Eriogonum teatleyae	Polygonaceae	Wild Buckwheat, Beatley	CA NV
3C	Eriogonum concinnum	Polygonaceae		NV
3C	Eriogonum contiguum	Polygonaceae		CA NV
3C	Eriogonum darrovii	Polygonaceae	Wild Buckwhat	AZ NV
3C	Eriogonum heermannii Var. floccosum	Polygonaceae	Eriogonum, Clark Mtn.	CA NV
3C	Eriogonum Ovalifolium Var. caelestinum	Polygonaceae		NV
3C	Fimbristylis spadicea	Cyperaceae		CA NV
3C	Geranium toquimense	Geraniaceae	Geranium	NV
3C	Gilia ripleyi	Polemoniaceae		CA NV
3C	Hackilia sharsmithii	Boraginaceae		CA NV
3C	Haplopappus eximius	Asteraceae		CA NV
3C	Haplopappus watsonii	Asteraceae		NV
3C	Hazardia brickellioides	Asteraceae		CA NV
3C	Hedeoma nanum Var. californicum	Lamiaceae		AZ CA NV
3C	Helianthus deserticola	Asteraceae		AZ NV UT
3C	Heuchera duranii	Saxifragaceae	Heuchera, Duran's	CA NV
3C	Hulsea vestita Ssp. inyoensis	Asteraceae	Hulsea, Inyo	CA NV
3C	Linantus arenicola	Polemoniaceae		CA NV
3C	Lomatium ravenil	Apiaceae	Desert-Parsley, Lassen	CA ID NV OR UT
3C	Lupinus holmgrenianus	Fabaceae	Lupine, Holmgren	CA NV
3C	Lupinus montigenus Var. montigenus	Fabaceae		CA NV
3B	Machaeranthera ammophila	Asteraceae		CA NV
3B	Machaeranthera grindelioides Var. depressa	Asteraceae		AZ NV UT

Table 2-12 Threatened and Endangered Plants for Nevada as Listed in the Federal Register, Vol. 45 No. 242, December 15, 1980 (cont.)

		Taxa Currently Listed		
Cat.	Taxon	Family	Common Name	Historic Distribution
3C	Machaeranthera leucanthemi-folia	Asteraceae	Palmer	CA NV
3C	Mimulus washoensis	Scrophulariaceae		NV
3C	Mirabilis pudica	Myctaginaceae		NV
3C	Opuntia pulchella	Cactaceae	Cholla, Sand	AZ NV UT
3A	Pelea storeyana	Rutaceae		NV UT
3C	Penstemon abietnus			NV UT
3B	Penstemon decurvas	Scrophulariaceae	Beardtongue	NV UT
3C	Penstemon leiophyllus	Scrophulariaceae		NV
3B	Penstemon nycensis	Scrophulariaceae		NV
*3B	Penstemon thurberi Var. anestius	Scrophulariaceae	Bearadtongue	NV
3C	Peteria thompsonae	Fabaceae		AZ ID NV UT
3C	Salvia funerea	Lamiaceae		CA NV
3B	Senecio lynceus Var. leucoreus	Asteraceae		NV
3C	Sidalcea candida	Malvaceae		CO NV NM
3C	Silene scaposa Var. lobata	Caryophyllaceae		ID NV OR
3C	Thelypodium laxiflorum	Brassicaceae		AZ CO NV UT

*Denotes species listed as critically endangered by State of Nevada.

Definition of Categories:

Category I - Taxa for which the service presently has sufficient information on hand to support the biological appropriateness of their being listed as endangered or threatened species. Because of the large number of such species, and because of the necessity of gathering data concerning the environmental and economic impact of listing and designations of critical habitats, it is anticipated that the development and publication of proposed and final rules concerning such species will require several years.

Category 2 - Taxa for which information now in the possession of the service indicates the probable appropriateness of listing as endangered or threatened, but for which sufficient

Table 2-12 Threatened and Endangered Plants for Nevada as Listed in the Federal Register, Vol. 45 No. 242, December 15, 1980 (cont.)

information is not presently available to biologically support a proposed rule. Further biological research and field study will usually be necessary to determine the status of the taxa included in this category.

Category 3 - Taxa no longer being considered for listing as endangered or threatened. Such taxa are included in one of three sub-categories, depending on the reasons for removal from consideration.

3A. Taxa for which the service has persuasive evidence of extinction. If rediscovered, however, such species might require high priority for listing.

3B. Names that, on the basis of current taxonomic understanding, do not represent taxa meeting the Act's definition of "species".

3C. Taxa that have proven to be more abundant or widespread than was previously believed, and/or those that are not subject to any identifiable threat.

Source: Federal Register, Vol. 45, No. 242, December 15, 1980.

Table 2-13 Federal and State Listed Threatened or Endangered Floral Species in Nevada with Known Eureka County Occurrence

FLORAL SPECIES		
Clokey Pincushion Cactus	Corypantha	
Dwarf Peppergrass	Lepidium nanum	Candidate 1/
One-Leaflet Torrey Milkvetch	Astragalus calycosus monophyllidius	Candidate 1/
Watson Oxytheca	Oxytheca Watsonii	Candidate 1/

1/ The Northern Nevada Native Plant Society (NNNPS) has recommended that those candidate species be placed in other designation categories and not be considered for listing as threatened or endangered at this time (BLM, 1983 status unchanged). Bulletin N60-EB2-13, 1981.

County.

Federal and State listed threatened or endangered species in Nevada with known Eureka County occurrence:

Clokey Pincushion Cactus	Corypantha vivipara rosea	Candidate 1/
Dwarf Peppergrass	Lepidium nanum	Candidate 1/
One-leaflet Torrey Milkvetch	Astragalus calycosus monophyllidius	Candidate 1/
Watson Oxytheca	Oxytheca Watsonii	Candidate 1/

Clokey Pincushion Cactus. This species belongs to the Cactaceae family and has a known distribution in Nye, Clark, Eureka, Lincoln counties, Nevada; San Bernardino County, California, and Mojave County, Arizona. This cactus is found at elevations of 5,000-9,000 ft. (1,500-2,744 m) and inhabits dry ridges in pinyon-juniper and mountain mahogany, or with black sage on shallow, well-drained soils and rocky areas in valley bottoms, on mesas or on mountain tops.

This species flowers from June - July and is threatened by collectors. (Rhoads, Cochrane and Williams, 1978; Holmgren, Shultz and Shultz, 1977).

Dwarf Peppergrass. This species belongs to the family Brassicaceae and has a known distribution in Nye, Elko, White Pine and Eureka Counties, Nevada. It may be found at elevations of 6,000-7,200 ft. (1,830-2,195 m) and inhabits well-drained soils, in sand or gravel with black sage in calcareous mountains. Blooms in June - July. (U.S. Forest Service, 1980).

One-Leaflet Torrey Milkvetch. This species belongs to the family Fabaceae and has a known distribution in northeastern Nye County to Eureka County and central Nevada. It is found at elevations of 5,600-6,500 ft. (1,710 to 2,000

1/ The Northern Nevada Native Plant Society (NNNPS) has recommended that those candidate species be placed in other designation categories and not be considered for listing as threatened or endangered at this time (U.S.D.I., 1983 status unchanged). Bulletin N60-EB2-13, 1981.

m) and inhabits open gravelly hillsides, in scattered pinyon-juniper, on limestone soils. Blooms from May to June. (U.S. Fish and Wildlife Service, Oregon, 1978; University Southern Utah, 1977).

Watson Oxytheca. This species belongs to the family Polyganaceae and has a known distribution in the Lake Mead NRA, Clark, Nye, Eureka and Mineral Counties, Nevada. It is found at 5,500 ft. (1,680 m) and blooms in July. No information was available on habitat. (U.S. Forest Service, 1980).

2.4.2 Protected Fauna and Species of Special Concern

Table 2-14 lists faunal species in Nevada that are currently listed as threatened or endangered. These species receive special treatment because of recent sharp declines in their abundance and their present rarity is in most cases due to human activities. None of the species listed are known to occur within the Mt. Hope site study area. Additionally, the potential for such occurrence is low based on review of habitat requirements and project area characteristics. There are, however, a few of these species with known occurrence in Eureka County, and these are listed in Table 2-15. Table 2-16 lists species in the area of special concern to the BLM and species being considered for addition to the list of endangered and threatened wildlife.

Other species protected by Nevada law include feral horses and burros.

Nine federally listed species are classified as endangered and include the bald eagle, peregrine falcon, Devil's Hole pupfish, Warm Springs Amargosa pupfish, Pahrump killifish, Moapa dace, Pahranagat roundtail chub, woundfin and cui-ui. The Lahontan cutthroat trout is federally listed as threatened. The gila monster, spotted bat and desert tortoise are all listed as threatened by the State of Nevada. The Utah/Snake Valley cutthroat trout is state listed as endangered. Forty-nine other species are currently being evaluated for threatened or endangered status in Nevada (candidate species, 47 FR 251, 12/30/82).

Table 2-14 Threatened and Endangered Faunal Species of Nevada

Common Name	Scientific Name	Present Classification	
		Federal	State
Mammals			
Spotted Bat	Euderma maculatum		T
Birds			
Bald Eagle	Haliaeetus leucocephalus	E	E
Peregrine Falcon	Falco peregrinus anatum	E	E
Reptiles			
Gila Monster	Heloderma suspectum		T
Desert Tortoise	Gopherus agasizzi		T
Fish			
Ash Meadows Amargosa Pupfish	Cyprinodon nevadensis mionectes		T
Devil's Hole Pupfish	C. diabolis	E	E
Warm Springs Amargosa Pupfish	C. nevadensis pectoralis	E	T
Pahrump Killifish	Empetrichthys latos latos	E	T
Railroad Valley Springfish	Crenichthys nevadate		T
Preston White River Springfish	C. baileyi albivallis		T
Mormon White River Springfish	C. b. thermophilus		T
Hiko White River Springfish	C. b. grandis		T
White River Springfish	C. b. baileya		T
Moapa White River Springfish	C. b. moapae		T
Moapa Dace	Moapa coriacea	E	T
Pahranagat Roundtail Chub	Gila robusta jordani	E	E
White River Spinedace	Lepidomeda albivalis		T
Woundfin	Plagopterus argentissimus	E	T
Relict Dace	Relictus solitarius		T
White River Desert Sucker	Catostomus clarki intermedius		T
Cui-ui	C. cujus	E	E
Lahontan Cutthroat Trout	Salmo clarki henshawi	T	
Utah/Snake Valley Cutthroat Trout	S. c. utah		E

T = Threatened
E = Endangered

Mt. Hope Molybdenum Project

Table 2-15 Federal and State Listed Threatened or Endangered Species in Nevada with Known Eureka County Occurrence

FAUNAL SPECIES

Common Name	Scientific Name	Group
Bald Eagle 1/	*Haliaeetus leucocephalus*	Endangered
American Peregrine Falcon 1/	*Falco peregrinus anatum*	Endangered

1/ Population Status: Transients or very isolated occurrence - not nesters or common visitors.

Mt. Hope Molybdenum Project

Table 2-16 Category C-2 Species Being Considered for Addition to List of Endangered and Threatened Wildlife and Species of BLM Interest in the Area 1/

Common Name	Scientific Name
Swainson's Hawk	*Buteo swainsoni*
Ferruginous Hawk	*Buteo regalis*
Long-billed Curlew	*Numenius americanus*
White-faced Ibis	*Plegadis chichi*
Prairie Falcon	*Falco mexicanus*
Greater Sandhill Crane	*Grus canadensis*

1/ Source *Federal Register* Vol. 47 No. 251, Category C-2 defined as:

"taxa for which information now in possession of the Service indicates that proposing to list the species as Endangered or Threatened is possibly appropriate, but for which substantial data are not currently available to biologically support a proposed rule. Further biological research and field study will usually be necessary to ascertain the status of the taxa in this category, and it is likely that some of the taxa will not warrant listing."

2.4.2.1 Bald Eagle (Protected)

The bald eagle is a resident from Alaska southward throughout the western states, but most commonly along the ocean. It occurs sparingly in the inland regions, along larger rivers and lakes, and may be found some distance from water in a few cases. In Nevada, the bald eagle is a winter resident only, found in desert valleys and along major waterways. Nevada supports approximately 100 birds each winter. Bald eagles feed primarily upon fish and waterfowl along rivers and lakes. Jackrabbits are a food source in the desert shrubland. Eagles roost in canyons and valley floors. In canyons, eagles often roost in groups, in tall trees and commonly on Douglas fir (Edwards, 1969). The canyons are usually 1,200 ft. above the valley floor and the roosts are located near the top of a ridge with easy access to valleys and freedom from human disturbance (Edwards, 1969). Bald eagles may also nest on ledges or cliffs within canyons. In the valleys, the eagles roosts are most often in trees and in planted groves of open valleys (Edwards, 1969). Extinction of this species is due to habitat loss, pesticide poisoning and shooting.

Bald eagles are occassionally seen in the Shoshone-Eureka Resource Area, however no winter concentrations or roost sites are known to exist.

2.4.2.2 Peregrine Falcon (Protected)

The peregrine falcon breeds from northern Alaska south to Mexico and winters from the coast of British Columbia south through Mexico, but chiefly in the coastal areas. In Nevada, this species is a spring and fall migrant, occurring in very small numbers. The peregrine falcon is known to nest on cliffs and ledges of limestone, sandstone, quartzite or volcanic rock, typically situated near water or a marsh; average height of the cliffs being 178 ft. (Porter and White, 1973). Smaller birds, especially waterfowl and shorebirds, are the main diet of the peregrine falcon. Decline in numbers of this species is attributed largely to pesticide contamination of the food chain, illegal capture by falconers, and general human disturbance. No peregrine falcon nesting is known to occur within the Mt. Hope study region.

2.4.2.3 Prairie Falcon (Special Concern)

Prairie falcon designation as a species of interest is based on Battle Mountain BLM District concerns regarding localized population status and stability in particular areas of the District. Although two SHF areas exist within the Mt. Hope site area which potentially represent habitat value for the prairie falcon, Mt. Hope and adjacent area prairie falcon incidence/ population characteristics are not the causative factor of species concern in the District. The prairie falcon resides in rocky, desert-like areas and nests in ledges or in holes in cliffs.

2.4.2.4 Swainson's Hawk (Special Concern)

Another species of interest in the area and undergoing review is the Swainson's hawk. This species breeds throughout the west and winters in South America. It nests in trees, on cliffs and sometimes on the ground. A Swainson's hawk was observed on power lines in the Mt. Hope project area during the 1979-1980 SHF study.

2.4.2.5 Spotted Bat (Protected)

The spotted bat is very rare in Nevada and little is known of its abundance and distribution. Occurring in low numbers and known from only a few locations in Nevada, it is impossible to determine population trends or the reasons for its rarity. The spotted bat is a nocturnal insectivore and roosts among caves, cave-like situations, cliffs, rock outcrops and sometimes in buildings; in rough, dry desert terrain (Watkins, 1977). It may be located in the Battle Mountain BLM District but is not known to occur in the Mt. Hope study region.

2.4.2.6 Desert Tortoise (Protected)

The desert tortoise is not found in the Battle Mountain BLM District but is known to occur in southern Nevada, with a northern range limit at the southern edge of Lincoln and Nye counties, and on the Beaver Dam slope in extreme southwestern Utah (Herron and Lucas, 1979). The desert tortoise is a

slow-moving land turtle with blunt, club-shaped feet and a relatively high arched carapace. It is a herbivore and related to the Giant tortoises of the Galapagos Islands. Preferred habitat is often in dense vegetation of creosote bush with Joshua tree or Mojave yucca with ground cover of six week fescue; found on bajadas or gentle slopes at elevations of 1,320 to 4,600 ft. (Stebbins, 1964; Karl, 1980).

2.4.2.7 Gila Monster (Protected)

The gila monster is not known to occur in the Battle Mountain BLM District, but is found in southern Nevada. The gila monster occurs in desert flats, lower slopes of mountains and nearby outwash plains, frequenting canyon bottoms and arroyos with permanent or intermittent streams; vegetation cover is creosote, salt-cedar, mesquite, four-winged saltbush and arrowweed (Stebbins, 1954, 1966; Funk, 1966; Bradley and Deacon, 1966). Gila monsters are slow-moving, partially nocturnal and seek shelter under rocks, in burrows and in dense thickets. They feed upon eggs, mice and other lizards.

2.4.2.8 Protected Fish Species

Most of the Nevada's protected fish species are endemic, occupying specific springs and rivers in certain valleys. None of the species are found in the Mt. Hope study area, and only three species, the Lahontan cutthroat trout, White River Spinedace and Railroad Valley springfish, are found within the Battle Mountain BLM District.

The Lahontan cutthroat trout is found in the Upper Reese River and Tierney Creek. Native species are also found in the Humboldt River System. It is presently under stocking conditions in the Roberts Creek area. This trout is protected as threatened by the federal government, but is classified as a game fish in Nevada and subject to sport fishing.

The White River Spinedace is a minnow and found in the Big Well area of the Railroad Valley Wildlife Area (introduced) and in the White River Valley. The Railroad Valley Springfish is a killifish which is endemic to hot springs in Railroad Valley.

Other protected fish species not found in the Battle Mountain BLM district are mostly concentrated in southern Nevada. These are the Pahranagat roundtail chub of the Ash Spring outflow in Pahranagat Valley; the Pahrump killifish in Pahrump Valley, Las Vegas Valley and also in the Shoshone Ponds Refugium in Spring Valley of east-central Nevada; the Devil's Hole pupfish, Ash Meadows Amargosa pupfish, and Warm Springs Amargosa pupfish all of the Amargosa Desert area; the woundfin of the Virgin River area and the Moapa dace in the Moapa Fish Sanctuary of Moapa Valley.

Several protected fish species are found in the White River system of the White River, Pahranagat and Moapa valleys. These species are the White River spinedace, White River desert sucker, Preston White River springfish, Morman White River springfish, Hiko White River springfish, White River springfish, and the Moapa White River springfish.

Species of east central Nevada include the relict dace of Spring and Steptoe Valleys, and the Utah/Snake Valley cutthroat trout of Spring and Snake Valleys. The cui-ui is found in the Pyramid Lake Valley of western Nevada.

2.4.2.9 Wild Horses and Burros (Protected)

Wild horses and burros are protected under Public Law 92-159, the Wild Free-Roaming Horse and Burro Act of 1971. This law mandates full-scale protection, management and control of wild horses and burros living on public lands managed by the BLM and U.S. Forest Service.

The following discussion on wild horses and burros in Nevada is abstracted from C. C. Publication 21, 1981 by the U.S. Dept. of the Interior, BLM Carson City District, and is entitled Palomino Valley Wild Horse and Burro Placement Center:

"The Wild Horse and Burro Act

The Wild Free-Roaming Horse and Burro Act includes the following provisions:

1. that wild, free-roaming horses and burros are living symbols of the historic and pioneer spirit of the West
2. are protected from capture, branding, harrassment or death
3. are considered to be an integral part of the natural system of the public lands
4. may not be commercially exploited; nor their remains
5. are to be managed by the BLM and U.S. Forest Service.

The law also directs that excess animals be made available for adoption by the public or humanely destroyed.

Definitions. A feral animal is one that escaped or was set free from domestication and has become wild. Wild horses and burros extant today are feral animals or offspring of feral animals. Federal legislation affords wild horses and burros the same status as native wildlife species (see provision under Wild Horse and Burro Act). This statue recognition makes the animals wild horses and burros. Without such recognition they would be feral horses and burros.

Population. With protection, wild horse and burro populations began increasing at a rapid rate. BLM estimated 17,000 horses and burros on public lands in 1971 when the Act was passed. By 1974, the numbers estimated by BLM and the Forest Service had increased to 44,000 horses. The estimate for wild horses in 1976 was 50,000 animals. BLM estimates the Nevada wild horse population (1980) at 32,300 animals. Wild burros number about 1,700. To maintain the present horse population (which BLM believes excessive) 5,000 animals will have to be removed each year. There are an estimated 55,400 horses and 12,400 burros nationwide. More than half the total wild horse population then, is in Nevada and that is where the BLM is concentrating its efforts. Most wild burros are in Arizona, California, Nevada and New Mexico."

In Nevada, the rapidly increasing population of wild horses is becoming a problem, and Attorney General Richard Bryan has filed a federal court suit to force the BLM and USFS to better manage these animals (Las Vegas Sun, 28 August, 1979). Burros are also considered a problem in many areas by land and wildlife management agencies. These animals are very

adaptive and can out-compete all native species. In some areas of Nevada, they are in direct competition with bighorn sheep and tend to drive the sheep out of their natural habitat (Zarn et al., 1977).

Wild horse herds in excess of 10 head count have been observed in the Mt. Hope bajada area (WRC, 1983). Several wild horse groups and considerable sign (scats) were also observed in the area of tailings pond Alternate 4-C. Use by cattle appeared to be virtually non-existent. Herd size was estimated at 155 head within the 192,000 acres of the Roberts Mountain and Whistler Mountain use areas (Shoshone-Eureka RMP/EIS, 1984).

2.5 Wilderness and Significant Natural Areas

The basis and criteria for wilderness and significant natural areas is discussed below and has been abstracted from the M-X ETR 18 on Natural Areas (HDR, 1980d).

"The National Wilderness Preservation System (NWPS), initiated under the Wilderness Act of 1964, currently consists of more than 19 million acres of land in the United States classified as wilderness within areas administered by such federal land-managing agencies as the Bureau of Land Management (BLM), U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), and National Park Service (NPS). Wilderness areas are roadless, primitive, unique natural areas of 5,000 or more contiguous acres of public land. A variety of interest from shepherds to scientists vie for use of the resources in wilderness areas (in 1979 areas administered by USFS received about 9.5 million visitor use days (Glenn, 1980)). The magnitude of the wilderness system, its current and projected use, and the controversy surrounding proposed additions to the wilderness system, make wilderness preservation a public issue.

The mandate to preserve wilderness is based upon a wide range of perceived societal benefits derived from the preservation of untouched wilderness resources. These benefits include:

- Preserving a sample of key ecosystems to ensure biotic diversity.
- Conserving gene pools and endangered ecosystems.

- Preserving natural areas for research and baseline ecosystem monitoring.
- Providing back-country recreation.
- Conserving wildlife and fish.
- Conserving scenic resources for tourism.
- Protecting a balanced land use pattern.
- Conserving a cultural heritage.
- Preserving aesthetic values.
- Providing educational opportunities.

All federal land-managing agencies are required to review the lands under their jurisdiction and to identify areas meeting the wilderness criteria set forth by the Wilderness Act (WA) of 1964 and the Federal Land Policy and Management Act (FLPMA) of 1976. The NPS, USFS, and USFWS have completed reviews of land under their jurisdiction and have identified areas for inclusion in the NWPS. The BLM is currently engaged in such a review.

The requisite characteristics to quality (sic.) an area for wilderness status are:

- Roadless (no routes improved or maintained by mechanical means) (FLPMA, 1976).

- Contains 5,000 or more acres of contiguous public land (FLPMA, 1976)

- Natural: affected primarily by natural forces with man's impact essentially unnoticeable (WA, 1964).

- Primitive: opportunity for solitude and unconfined recreation (WA, 1964).

- Ecological, geological, scientific, educational, scenic, or historical factors (WA, 1964).

- Protecting natural areas for research and scientific [illegible] education.
- [illegible]
- Conserving wildlife and fish.
- [illegible] for tourism.
- [illegible] land use [illegible]
- Preserving a cultural heritage.
- Protecting aesthetic values.
- Providing educational opportunities.

All federal land-managing agencies are required to [illegible]

[illegible]

In January 1979, the U.S. Forest Service completed its wilderness identification program called Roadless Area Review and Evaluation II or "RARE II" as published in a Final Environmental Impact Statement. In these recommended areas, "no activities which might alter wilderness qualities of the land will be allowed, unless permitted by law or prior right, and entry for development purposes will be prohibited" (USFS, 1979). The NPS, USFWS, and USFS will have satisfied their mandates when congressional action on those roadless areas currently being reviewed is completed.

The BLM identification of wilderness areas is scheduled for completion in 1991. It has presently completed the intensive inventory phase and several areas have been identified as Wilderness Study Areas (WSAs). Although these areas are not designated wilderness areas, they are managed as such under the Interim Management Policy and Guidelines set forth by the Deparment of the Interior.

All BLM lands currently under review for incorporation into the NWPS will be managed as directed by FLPMA, Section 603(c); that is, "so as not to impare the suitability of such areas for preservation as wilderness," as prescribed in the Department of the Interior's Interim Management Policy and Guildelines for Lands Under Wilderness Review, (December 1979). The BLM is directed to meet the nonimpairment criteria in management of the lands and their resources, and to afford environmental protection. Mineral and grazing uses are allowed to continue in the manner in which they were being conducted on the date of approval of FLPMA (October 21, 1976). Examples of uses which would be incompatible with the Interim Management Guidelines include new utility corridors and power generating statinos.

Prior to the passage of FLPMA in 1976, several areas on federal lands had been set aside as Research Natural Areas (RNAs) for scientific and educational purposes, and as Outstanding Natural Areas (ONAs) for recreation. As mandated by FLPMA all these previously designated natural areas were identified as Instant Study Areas (ISAs) and reevaluated for wilderness characteristics. In addition, there are several candidate Areas of Critical Environmental Concern (ACEC) under consideration by the BLM. These are, however, only recommendations and have no formal status. To date, only one

has strong potential for being designated as ACEC and that is an upper Miocene fossil insect collection in Stewart Valley near Gabbs, Nevada."

2.5.1 Wilderness - Nevada

Currently, Nevada has one designated wilderness area: the Jarbidge Wilderness Area in the Humboldt National Forest of northeastern Nevada. The area is administered by the USFS and is located 140 miles northeast of Mt. Hope.

Several roadless areas have been proposed for wilderness status and several other areas have been administratively endorsed as additions to the NWPS. In Nevada, the Bureau of Land Management, which has completed the intensive inventory phase of the wilderness review, has recommended nearly 5 million acres as Wilderness Study Areas. These recommendations were released for a 90-day public comment period in April 1980 prior to the final WSA determination in late 1980. Certain areas already have been intensively studied under special high priority project requirements such as land transfers, and energy projects and either have been dropped from wilderness consideration or have been designated as WSAs. A study conducted in the Mt. Hope region for three possible Wilderness Study Areas were evaluated in the Shoshone-Eureka Resource Management Plan. The Wilderness Study Areas evaluated were the Roberts (NV-060-541), Simpson Park (NV-060-428) and Antelope (NV-060-231/241). Following this study, the Bureau of Land Management has proposed the Roberts Wilderness Study Area (W5A-NV-060-541) as suitable and meeting national wilderness area criteria. The eastern perimeter of this area is located approximately 5.6 miles west-northwest of the Mt. Hope site area's western boundary.

The Roberts Mountain area was additionally included in a Nevada Natural Heritage Study and was recommended in the Great Basin Review Board for inclusion in the National Natural Landmarks Inventory. The heritage site's eastern boundary is within 2.0 miles (Division of State Parks, 1983) of the proposed land acquisition boundaries.

Complete environmental assessment of the Roberts WSA including consideration of the proposed Mt. Hope mine project (re: land tenure adjustments) has been published in the Draft Shoshone-Eureka Resource Management Plan and Environmental Impact Statement (June, 1983). The following discussion on the Roberts Wilderness Study area has been taken from that publication:

The Roberts Wilderness Study Area NV-060-541 (as described in U.S.D.I., 1984). According to the Bailey-Kuchler system of ecosystem classification (Bailey, 1976), the Roberts Wilderness Study area lies within the Pinyon-Juniper Woodland Ecosystem. The Pinyon-Juniper Woodland Ecosystem is currently not represented in the National Wilderness Preservation System.

The Roberts Wilderness Study area is located in the Roberts Creek Mountains and contains approximately 15,090 acres of public land (approximately 0.3 percent of the resource area). It is oval shaped and surrounded on three sides by major valley systems. For the relatively small amount of acreage involved, the unit offers diverse features and characteristics not common in central Nevada.

The area is generally free from human imprints and is in a natural state. Those imprints present are substantially unnoticeable in the Roberts Wilderness Study area as a whole. Five ways are in the unit (vehicle routes established and maintained solely by motor vehicle passage). Three fences protrude into the unit. No known water developments are present. A small mining prospect was found on the western side of the unit, but is substantially unnoticeable in the area as a whole. No potential exists for changing the area's boundaries. The nature of the intrusions does not warrant their exclusion.

Ranches and roads outside the boundary are visible in the distance from certain points inside the Roberts Wilderness Study area. These are considered minor and may add to the wilderness experience by giving one a sense of remoteness and isolation, and also by heightening the user's awareness and appreciation of the area's outstanding wilderness values in contrast to sights and sounds outside the wilderness area.

There are no existing major noise sources outside the unit that would have an affect upon the wilderness experience. The potential does exist for two new mining operations to start in the future near the Roberts Wilderness Study area. Several roads form the boundary around portions of the unit. There may be vehicle sounds, but these would not adversely affect the wilderness character of the area. Currently, the roads are not heavily traveled.

The unit contains outstanding opportunities for solitude. Spread over an extremely jagged and varied topography the unit is characterized by narrow, deep canyons forested with willow, cottonwood, aspen, birch, and dogwood trees. Barren rock ridges and isolated stands of mountain mahogany and limber pine combine with the canyons to offer abundant natural screening and offer many opportunities for the user to find a secluded spot. The Roberts Wilderness Study area also offers outstanding opportunities for primitive and unconfined recreation. The unit offers a wide diversity of terrain, vegetation and scenery. The massif consists of a series of rugged peaks forming a broken ridge. Numerous canyons and valleys surround the ridge breaking the unit into numerous areas.

Late spring through late fall is the best time for travel in the area. August and September can be hot (90 to 100 degrees) at the lower elevations but the higher slopes are usually pleasantly cool. Winter temperatures are extremely cold (very often sub-zero). High winds and almost perpetual clouds at the higher elevations make winter travel unadvisable except in the sheltered canyon bottoms. Snow depths at these lower elevations are usually sufficient for snow travel.

The Roberts Creek-Vinini Creek and the Dry Creek areas offer slopes of varying degrees and a variety of scenic attractions for cross-country skiing and snowshoeing. Suitable snow depths usually occur throughout this area.

Horseback riding is fairly easy throughout this area and access to the bowl just below the peak of Roberts Mountain is not difficult. For

extended travel, one can climb out of the bowl and drop into the Pete Hansen or Dry Creek drainages.

The south side of the unit is steep and provides few opportunities to penetrate the unit. There are a number of small caves above Roberts Creek. Most are located on cliff faces and may require some degree of rock climbing ability. The rocks are Devonian sedimentaries with numerous fossils, but are crumbly.

The road along the south side of the unit provides access to the upper end of the south fork of Pete Hansen Creek and the routes previously discussed there.

Considering the small amount of acreage contained in the unit, the area offers a wide variety of special features. Much diversity in ecological features is found.

Because of its rapid change in elevation, the unit exhibits a variety of habitats in close proximity to one another. These include the northern desert shrub community, a pinyon-juniper tree forest, a sub-alpine herbacious/sage community, and a scattered boreal forest of limber pine. Open stands of mountain mahogany replace the pinyon/juniper forest and sub-alpine vegetation in some areas, primarily on south-facing slopes.

The Roberts thrust, responsible for the mountain's existence, is one of the great structural features of the intermountain west. This provides for excellent geological study. Universities as far away as Ohio and Nebraska, and students from England have participated in geologic field trips and mapping exercises in the area during the summer months. The main scientific values of the area are its "window on the mantle" characteristic, a geological formation associated with the Roberts Mountain Thrust Fault, and the ecological island aspect of the higher elevations. The unit offers much scenic value and dominates the view for miles around. Western Peak, a rocky, high-elevation point, is an interesting formation, and offers scenic value from many observation points outside of the unit. A small perennial twenty-five foot waterfall occurs in the north fork of Pete Hansen Creek. Two small seasonal ponds are

found on Roberts Creek Mountain. Numerous caves and at least one natural arch are found in the rock cliffs within the unit.

Wilderness designation of the Roberts Wilderness Study area would create some problems for manageability due mainly to an unrecognizable boundary on the west and north sides. Installation of boundary signs at frequent intervals along this section would be necessary if the area were designated as wilderness. Closure of one way along the southern boundary may present a small problem for manageability because it would be difficult to prevent four-wheel-drive vehicles from using it. However, the area is considered to be manageable over the long term. There are no private inholdings or state lands within the area, but mining claims and leases do exist that have potential for further development. There are no rights-of-way proposed within or near the unit. Livestock grazing takes place throughout the unit and is a valid existing right.

2.5.2 Significant Natural Areas (HDR, 1980d)

"Significant natural areas" is a general term used for areas set aside by various federal and state agencies to be managed and preserved for their unique ecological and/or geological characteristics. These include proposed and designated Natural Landmarks (DOI, Heritage Conservation and Recreation Service, Division of Natural Landmarks); National Wildlife Refuges and Ranges (USFWS); Unique and Nationally Significant Wildlife Ecosystems (USFWS); National Parks and Monuments (NPS); State Wildlife Management Areas (Nevada Department of Wildlife); and State Parks (Nevada State Parks Division). The National Landmarks Program, previously managed by the NPS, is now under the Heritage Conservation and Recreation Service, Division of Natural Landmarks (DNL), in cooperation with the Division of State Parks in Nevada. All these departments are currently conducting an inventory of proposed natural landmarks. Four such key natural areas in eastern Nevada are on the National Registry of Natural Landmarks. These include:

1. The Hot Creek Springs and Marsh in Nye County. The landmark is being considered for expansion to include the Wayne Krich Wildlife Management Area. The springs and creek support a good population

of the rare White River Springfish (*Crenichthys baileyi*), and the marsh is a haven for wildlife. The Nevada Department of Wildlife has fenced this area to provide a sanctuary for the rare fish.

2. The ichthyosaur site in the Toiyabe National Forest in Nye County is an outstanding fossil area where fossil remains of the Jurassic ichthyosaur have been found. The site is also a state park.

3. Lunar crater in the BLM Battle Mountain District is an outstanding geological feature about 3,800 ft across and 430 ft deep which covers more than 400 acres (BLM, 1979). The volcanic field surrounding it is a National Natural Landmark characterized by its lava flows, cinder cones, and numerous craters as well as the beautiful displays of wildflowers, particularly the showy scarlet globe mallow (*Sphaeralcea* spp.). It is currently managed by the BLM as a recreation area.

4. Valley of Fire near Las Vegas is a state park managed as a natural area for its unusual red rock formations and excellent examples of both Mojave Desert and Great Basin flora and fauna.

Several other areas have been designated natural landmarks pending registration, and a large number are potential natural landmarks (recommended in natural history theme studies) pending further studies.

CHAPTER 3.0
IMPACT ANALYSES

3.1 Introduction

Implementation of the proposed action and alternatives would result in certain long-term and short-term alterations to the existing biologic environment. Categorized in the following discussion by vegetation and fauna, the analysis of potential biologic resources impacts was conducted with an emphasis on the following major criterion of effects:

1) Vegetation Productivity/Forage Losses;
2) Reclamation Success Potential;
3) Fauna Habitat/Population Losses;
4) Impacts to Rare, Endangered and Threatened Species;
5) Wilderness Study Area Impacts.

Impact analyses were also related to degree of concern that federal and state agencies or other interested parties have established regarding species value, and the effects of herbage loss and replacement in terms of fauna and livestock use patterns.

While other potential impacts may be identified, some of which are included in this Technical Report, the above listed points of emphasis represent the items of significant concern brought forth during EIS public scoping meetings and various agency communications.

Pertinent assumptions and certain guidelines to analysis of impact are listed in Section 3.2. Sections 3.3 through 3.7 detail the anticipated ecological impacts determined by analysis of implementing the proposed action and/or alternatives. Implementation of the no action alternative would negate the occurrence of impacts herein associated with the proposed action.

3.2 Assumption and Analysis Guidelines

The determination of environmental impacts upon the biologic resources base required that certain assumptions be made which would affect conclusions regarding significance of impact and nature of impact (beneficial/detrimental). The general assumptions used in the analyses are presented below.

1. It was assumed that the proposed action and alternatives, particularly land disturbance and the use and management of process water, described briefly in Chapter 1.0 of this Technical Report and in detail in Chapter 2.0 of the EIS and Technical Report No.1 would be implemented as described. Mitigation measures described in the EIS would be in place at time designated and as described. Assumptions 2 through 14 below highlight particularly important aspects of the proposed action and alternatives described, as related to biologic resources.

2. The proposed action would result in the disturbance of the following acreages of land:

	Temporary
Mine Pit	700 acres
Non-Mineralized Material Storage Areas (2)	2,400 acres
Tailings Pond 4-A	3,460 acres
Evaporation Pond	165 acres
Plant Site and Auxiliaries	100 acres
Site Access Road	30 acres
Power line 2-A (3.5 acres/mile)	77 acres
Water Line	132 acres
State Route Relocation	67 acres

Approximately 200 acres would be impacted by the proposed development of an employee subdivision. The impacts associated with the subdivision development relative to biologic resource effects were not evaluated as

to specific geographic location because of the uncertainty of eventual subdivision siting location. Generalized impacts were evaluated.

The alternatives (excepting the no action alternative) would, upon implementation, result in the alternate disturbance of the following acreages of land.

Power Line 2-B	73.5 acres
Power Line 2-C	80.5 acres
Power Line 3-B	108 acres
Power Line 3-C	96 acres
Tailings Pond 4-B	5,650 acres
Tailings Pond 4-C	2,173 acres

3. Of the areas undergoing initial project activity disturbance, contemporaneous reclamation would occur only along rights-of-way corridors and within the areas of the process plant site between corridors. Remaining areas would not be reclaimed until cessation of ore removal operations. Upon cessation of mining, the mine pit and non-mineralized material storage areas would not be reclaimed, all other areas would be reclaimed.

Of the areas undergoing contemporaneous reclamation, the following operational acreage disturbances would occur through mine life (or permanent if roads, power lines and water lines are left intact for other use).

Proposed Action	Initial Acres	Contemporaneous Acres
Power Line 2-A	77	40
Power Line 3-A	132	42
Alternatives		
Power Line 2-B	73.5	38
Power Line 2-C	80.5	41
Water Line 3-B	108	34
Water Line 3-C	96	25

4. Reclamation after construction (rights-of-way corridors and interplant acres) would consist of stockpiled topsoil redistribution, regrading and revegetation of a ground cover as soon as possible after the construction activity was completed. Construction periods would be 11 weeks for power line; 12 to 16.5 weeks for water line; and up to two years for process plant components.

5. Topsoil and overburden would be removed and stockpiled from primarily the tailings pond site area and non-mineralized material storage areas. If the topsoil stockpiles were to exist for more than one year, they would be seeded for stabilization.

6. Final reclamation would primarily entail, in part the following, as determined by regulations existing to date.

   Mine/Non-Mineralized Material Storage Areas. The open pit mine would remain as it would exist at the end of mining. Because of the non-mineralized material storage areas would be composed of large rocks, they would not be recontoured or reclaimed.

   Process Plant. The process plant and other capital facilities would be salvaged as much as possible. Unsalvagable portions would be demolished and disposed of either offsite or in the landfill. The surface would be cleaned up, graded as necessary, and revegetated. The revegetation program would be developed following regulatory requirements and BLM specifications to date. It has been assumed that the procedures recommended for rehabilitation (Section 3.3.2) would be implemented as part of a reclamation program. The period of project life plus establishment of successful reclamation has been set at 60 years (50 years mine life, 10 year final reclamation period). The BLM recommended cover (U.S.D.I., 1983e) is a mixture of crested wheatgrass, pubescent/intermediate wheatgrass and furrowing saltbrush applied at the rate of six, three and one lbs/acre, respectively.

   Tailings Pond. After the tailings pond surface has dried out, approximately two feet of rock from the non-mineralized material storage areas would

be placed over the tailings. As much as possible, this rock layer would then be covered with the overburden/topsoil stockpiled during construction. The cover would then be seeded with the cover groundcover specified above and pinyon and/or juniper trees would be planted. This cover would be contoured so as to minimize seepage of precipitation into the tailings.

The slope of the final cover surface would be graded appropriately, and the downstream face of the tailings pond dam would be recontoured to the extent necessary to maintain stability and control erosion during the tailings basin dry-out period.

7. Activity during construction along rights-of-way corridors would be conducted under conditions set forth as BLM reclamation/revegetation guidelines.

   Most particularly, the following:

   - Clearing of the disturbed area would be kept to a minimum. Vegetation cover would not be removed from any area unless necessary for construction and approved by BLM.

   - All construction access would be reviewed and approved prior to construction with existing roads and trails used wherever possible. All travel would be limited to specified overland routes unless existing roads and trails are available for use. Natural grass and low brush would not be routinely removed.

   - Public land areas used for temporary access roads, equipment storage, and other construction activities would be restored to their natural state insofar as practicable and in accordance with a restoration plan approved by BLM.

   - Revegetation would be required in areas identified by BLM on the date specified.

- Reasonable means would be used to minimize erosion and soil damage in connection with any construction, rehabilitation, or maintenance operations, including, but not limited to, construction of water bars, cross ditches, or other structures, if necessary.

- Any ruts, depressions, or other such disturbance caused by construction would be restored.

8. Direct contamination of soils by process components or mine operations would occur but would be of limited extent (e.g., machinery oil on topsoil, etc.). It was assumed that standard operating procedures would include protective measures (e.g., stockpile sign marking, restricted traffic). Atmospheric contamination of soils and vegetation would not be significant, as detailed in Technical Report No.3.

9. Avoidance routing of rights-of-way, via the corridor method and on-site forward reconnaissance during actual construction, would be continued and implemented during proposed action and/or alternatives initiation. The impact discussion presented herein relates to known potential for impact, much of which has been mitigated to date by the coordinated efforts of the BLM and EXXON (e.g., water line 3-A realignments to avoid close proximity to certain Kobeh Valley sage grouse strutting grounds).

10. For worst-case impact assessment purposes, it was assumed as necessary that essentially all of the 10,000 acre Mt. Hope area would be disturbed during the life of the project. "Disturbance" has been defined for analytical purposes as "effective area of disturbance" and does not necessarily connote actual physical disturbance.

11. Electrical distribution systems have been assumed not to present electrocution danger to fauna, as design of power line facilities and line structures has incorporated such consideration.

12. As discussed in detail in Technical Report No.1, EXXON would be required to achieve a no discharge standard at the tailings pond for its process design in two point source categories (ore mining and dressing, molybdenum

dressing). To do so, EXXON would employ measures recommended by the EPA, and considered by that Agency to be best available demonstrated technology (BADT). Among these measures are recycling process water from the concentrator, employing the tailings pond and lined pond as evaporation/settling basins, and lime precipitating wastewater flow from the hydrometallurgical plant.

13. Seepage from the tailings basin would be regulated through issuance of a Zero Discharge or Subsurface Injection/Infiltration permit by the State of Nevada Department of Environmental Protection under the authority of NRS 445.131 through NRS 445.354. Which of these permits is issued would depend upon the nature of the seepage and the design of the tailings pond.

    EPA toxicity tests show that the tailings would not be classified as hazardous (see Technical Report No.5). Although no long-term significantly adverse effects from seepage from the tailings basin to groundwater are expected, it has been assumed that a clay or synthetic liner would be installed if permit analyses and/or approval requirements necessitated such.

14. Finally, monitoring wells would be installed at the foot of the tailings dam to regularly check for potential changes in groundwater quality related to seepage from the tailings pond. The frequency of monitoring and parameters tested for would be mutually agreed to by EXXON and the Nevada Division of Environmental Protection. If necessary, seepage would be intercepted by a series of wells and pumped back to the tailings basin.

Several specific assumptions used in the evaluation of potential biologic resource impacts calculating changes in erosion rates are discussed in each of the following sections.

3.3 Vegetation Productivity/Forage Losses

3.3.1 Proposed Action

Vegetational resources, primarily pinyon-juniper and big sagebrush communities, would be affected from the construction and preoperational stripping of proposed action component areas. Construction and operation of the mine/non-mineralized material storage areas would result in the permanent vegetation loss within 3,440 acres. The vegetation affected within these areas would equal approximately 2,439 acres of pinyon-juniper and 1,001 acres of big sagebrush community types. Pinyon-juniper losses would occur in the mine pit area (673 acres) and south and north non-mineralized acres (1,600 and 166 acres, respectively). Sagebrush vegetation losses would occur as follows: mine pit - 22 acres; southern non-mineralized area - 47 acres; northern non-mineralized area - 932 acres.

Construction and operation of the process plant and tailings pond would involve the short-term loss of 3,558 acres of vegetation including pinyon-juniper (709 acres), big sagebrush (2,200 acres, 100 of which represents the process plant area) and black sagebrush (649 acres) community types.

Construction and maintenance of the highway by-pass, water and power lines would result in the disturbance of 276 acres. Permanent disturbance of vegetation would total approximately 136 acres. Predominant vegetation along the proposed power and water lines is represented by pinyon-juniper (85 and 70 percent, respectively). Big sagebrush with codominant pinyon-juniper composes the remaining areas.

The above described changes to the vegetational resource base were generally determined not to pose significant adverse impacts. Within the Eureka Resource Conflict Area (RCA) totalling approximately 1,938,000 acres, the estimated current ecological range condition of the area is reported as being fair to excellent for 96 percent of the total, with 32 percent of the total acreage being in good to excellent condition. Additionally the vegetational trend has been evaluated to be stable (82 percent) or indicative of improving range condition (upward trend, 12 percent) (Shoshone-Eureka

RMP/EIS, USDI). As the change in condition, by one or more condition classes, would obviously occur as a result of vegetation removal over the long-term or short-term an adverse impact would occur. The total acreage involved, however, would equal less than one-half of one percent of the Eureka Resource Conflict Area. Change in ecological condition classes within the RCA would be significantly below the 10 percent critical threshold or level of significance. On a worst-case basis the assignment of the vegetational acreages loss to the existing RCA downward acreage of 31,889 would only result in a 0.1 percent increase in that parameter measurement of vegetation condition trends; a change also significantly less than the 10 percent critical threshold or level of significance assigned for impact evaluation.

The impact associated with the vegetation loss relative to range condition and trend, in combination with the consideration of the vast acreages of similarly vegetated lands, was determined not to be regionally significant. Neither regional productivity or vegetational characteristics would be affected.

Forage Value. Forage value can be represented, in part, by range characterization in terms of AUMs - the amount of forage required by one cow or equivalent for one month. Total AUM values in the Mt. Hope area range from 358 to 438. Approximately 87 percent of the AUMs allotted (311-381) exist as part of the Romano Allotment totalling 3,034 to 3,708 AUMS. The remaining 13 percent of the AUMs allotted in the Mt. Hope area (47 to 57) exist as part of the Roberts Mountain Allotment which includes 18,444 to 22,542 AUMs. In terms of vegetation loss, approximately 100 to 115 AUMs would be affected by project implementation and would occur as a long-term impact as follows:

Mine Pit - 18 to 22 AUMs
Non-Mineralized Material Storage (South) - 40 to 50 AUMs
Non-Mineralized Material Storage (North) - 39 to 47 AUMs

The short-term impact of forage loss would include the areas designated for reclamation, including the plant site (7-9 AUMs) and tailings pond 4-A (123-152 AUMs). Based on the reclamation success potential evaluation

(Section 3.4), it has been determined that the short-term vegetation losses would be mitigated equally or in excess to that affected (e.g., topsoil replacement could allow an establishment of a growing base of higher quality than that presently existing).

Direct impacts relative to the long-term loss of area forage (the equivalent of 100 to 115 AUMs) were determined not to be significant due to the substantial quantity of similarly vegetated areas within the region as well as the significantly small area of disturbance on a regional basis. (See Technical Report No.8 for detailed discussion of grazing allotment impacts). Additionally, the long-term loss would equal less than 10 percent of the existing baseline allotment totals, cummulatively or individually.

Direct impacts relative to the short-term loss of AUMs during project life (AUMs within land acquisition boundary assumed in accessible) would equal less than two percent of the combined Roberts Mountain and Romano allotments. However, on an individual basis the reduction in AUMs within the Romano Allotment would total 10.25 percent. As discussed in Technical Report No.8, the significance of AUM loss to an individual grazing permitter has come under BLM review and procedural establishment on a national basis to afford a level of mitigation. Policy to date includes appropriate and timely notice to grazing permitters in order that the overall effects of AUM loss can be ameliorated over a reasonable period of time.

Woodlands Harvest. A significant impact relative to local land use and vegetation would however, occur. The Mt. Hope site currently represents a prime commercial Christmas tree cutting site, producing a sustained yield of 300 to 500 Christmas trees annually (U.S.D.I., 1983f). Assuming the permanent disturbance of the total harvest area, a loss of more than 10 percent of the annual harvest for the Shoshone-Eureka Resource area would result. No measures have been proposed to mitigate the impact of Christmas tree harvesting losses. Of the lands classified as available for woodland products management in the Shoshone-Eureka Resource area, less than 20 percent or 120,000 acres is currently accessible for harvest activities. The loss of harvest represented by implementation of the proposed action and/or alternatives would be expected to promote potentially detrimental increases in available area harvest lands

(over harvest) and/or access development to previously unharvested areas, with or without appropriate authorization. In combination with the associated population influx of the proposed action/alternatives (up to 808 households at peak, 614 households at equilibrium), a significant adverse potential for woodland impacts has been determined on a regional, as well as local, basis.

Riparian Vegetation. There are no riparian areas on site to be affected; however, the possibility exists that small riparian areas (e.g., seeps) may be affected offsite within the groundwater drawdown area of the well field in Kobeh Valley. The extent of such limited riparian areas has not been quantified although various water bodies of large extent (e.g., streams, springs) have been inventoried along the mountain and hillside ridges. These springs and streams (Technical Report No.4) would not be significantly affected by groundwater drawdown (Hydro-Search, Inc. 1983, personal communication).

For impact purposes, it has been assumed as a mitigation measure that watering impoundments or troughs would be mutually considered for development by the BLM, EXXON and Nevada Department of Wildlife.

In terms of spring-associated vegetation, the Mt. Hope spring is in a pinyon-juniper area. The spring water issues from a pipe, providing a small quantity (0.5-1.0 gpm) of flow into a trough. Overflow water then disappears into the ground within 50 feet of the trough. A small amount of grasses and herbs grow within a short distance of the spring but riparian vegetation is neither extensive or abundant. A second spring exhibits itself as a muddy trampled area within a sagebrush (exposed eastern exposure) slope. No riparian habitat was evident, apparently due to extensive trampling by cattle, deer, or horses. It has been assumed that vegetation associated with the spring sites would be affected by project implementation.

Development of the mine pit and consequent water inflow may adversely affect the Mt. Hope spring by source interception. Although this is not presently anticipated, the geohydrologic character of Mt. Hope spring being thought to be isolated from eventual mine pit inflow water sources, a worst-case basis of assessment appears reasonable due to the limited extent of data quantification. In the case of the second spring, its location within the

proposed tailing pond area would result in eventual burial by tailings material.

The lack of substantial riparian vegetation at either spring site significantly reduces the extent or importance of impact. No significant impact was determined relative to vegetation resource effects.

Miscellaneous Impact Evaluations. Off road vehicle (ORV)-caused damage to vegetation would be a secondary result of the large population increase in the area and could result in a large, but unquantified, loss (HDR, 1980). This could be a local and regional effect and is considered to be proportional to the population increase. Presently, much of BLM land may be used by ORV's. Effects may be short-term or long-term depending on the intensity of use in any area.

No site specific studies have been conducted to assess the presence of any unusual vegetative communities or species along the water power or highway relocation rights-of ways, although these are not likely to occur in these surroundings. A worst-case analysis, assuming that any unusual species or communities along the rights-of-ways be destroyed, was not considered justifiable in that the corridor method of alignment has specifically been incorporated into project design to afford the opportunity for avoidance routing should it be necessary. As such, it has been assumed that no significant impact would occur. The data base evaluated to date including the vegetation mapping conducted by the BLM, infrared photographs examined, and the reported surveys of the M-X Missile EIS (HDR, 1980) indicate a very low potential for the occurrence of unusual vegetative communities or species within the lands affected by the project components.

As reported in Technical Report No.3, Meteorology and Air Quality, significant deterioration in air quality as a result of project implementation would not occur. The regulatory standards and National Ambient Air Quality Standards (NAAQS), the compliance with which EXXON would be required to demonstrate, have been specifically established by federal and state law to definitionally preclude significant adverse impacts. The considerations originally formulated to base limitations upon included the protection of vegetational resources, particularly agricultural vegetation. As such,

compliance by EXXON would preclude impact to Mt. Hope area vegetation and the agriculturally important Diamond Valley area. Technical Report No.3 details the independent evaluation of compliance relevant to EXXON's process plant and mining plans.

As in any construction effort conducted in an arid climate regime, fugitive dust created by secondary road travel will be deposited within a close range of distance to the road travelled or other dust source. On a regional basis, the extent of fugitive dust created has been quantitatively assessed to be low (Technical Report No.3). Effects of dust deposition would be limited to within close proximity of the dust source.

3.3.2 Alternatives

Impacts to the area's vegetational resources would be similar in extent to that described for the proposed action. No significant adverse impacts have been identified. For total vegetational acreage there is only about a 5 to 10 percent variance (15-30 acres) between alternative power line routes. Vegetation type consistently predominates as big sagebrush. The proposed tailings pond alternative 4-B would encompass 5,650 acres, 63 percent greater than the proposed action and more than 260 percent larger than tailings pond alternative 4-C. Although vegetation cover, big sagebrush is common and extensive throughout the region, an indirect impact would result from the loss of vegetation productivity equal to approximately 63 to 77 AUMs. Alternative site 4-C encompasses the least amount of vegetational acreage but exhibits a high degree of diversity as big sagebrush-juniper woodlands exist at higher elevations and big sagebrush at lower elevations. Because of the relatively high diversity and an associated vegetation productivity equal to an approximate AUM value of 76-94 to fauna and livestock, alternative site 4-C represents the least preferred alternative relative to vegetation impacts.

Impacts to woodland harvest (Christmas trees) would remain identical to that described for the proposed action. Selection of an alternate tailings pond would not alter the total resource area affected as the proposed tailings pond does not represent the area of vegetational resource utilization affected. Demand and areas influenced by demand may be altered under the Decentralized

or Dispersed Workforce alternative as those persons located in Elko and nearby Carlin would probably fulfill their demand use from the resources, commercial and noncommercial, in the Elko-Carlin area. The degree of variation in impact has not been quantified. On a one-to-one basis, demand would be reduced in the Eureka area by 30 percent or more (544 households vs 368).

The insignificant loss of the identified but unnamed spring in the proposed tailings pond area would be precluded by alternate site selection. Based on the data available (including site reconnaissance by Wahler Associates), selection of Alternate 4-B or 4-C would not involve the burial of water resources by tailings material.

Impacts related to ORV-caused damage would be similar to that described for the proposed action except that the rate or extent of damage would probably be reduced locally by the dispersion of population in the case of the decentralized housing alternative. The extent of regional influence could correspondingly increase, however, due to the areas proximate of residence, i.e., Elko and Carlin.

As in the proposed action case, significant adverse impacts resultant from atmospheric emissions would not be expected. Impacts along rights-of-way to unique vegetational communities or species would also not be expected.

3.4 Reclamation Success Potential

As presented in Section 2.5.1 of the Mt. Hope Environmental Impact Statement and briefly outlined in Section 3.2 of this Technical Report, EXXON has presented a reclamation/revegetation program description pertinent to contemporaneous and post-mining activities. The EXXON program was developed on the basis of reclamation regulations currently in force and was generally characterized by a three-phase scenario of activity: post construction, operational and post-mining. As is often necessary, however, due to the early stage of project planning, the program of reclamation described represents a generic outline of intended activity by type versus the more detailed and specific program that would eventually be required at time of project initiation. For example, the actual initiation of power or water line construction

along the designated rights-of-ways would be accompanied by a BLM required reclamation program specifically formulated for the area to be affected and in accordance with applicable regulations. EXXON would be required to comply with the rights-of-way program. Until such time that actual rights-of-way granting was accomplished, it is unlikely that the reclamation program would be developed in detail beyond that presently outlined in a generic manner.

Relative to the actual area of mine operations within the land acquisition boundary area, once the land was acquired and designated as being held in private ownership, BLM or other agency authority pertaining to reclamation program design and enforcement would not be a direct factor. Reclamation authority would, however, be a secondary factor in that off-site conditions would remain under regulatory review auspices and the protection of the environment would require assurances that the EXXON operation would not adversely affect natural resources as a result of reclamation failure or other operational components. An example of such secondary reclamation authority would entail maintenance of water quality. Failure to implement reclamation efforts in the tailings pond area could forceably lead to degradation of off-site water quality conditions. If such were to occur, regulatory entities of both the state and federal governments are empowered with legal authority to enforce corrective measures. Additionally, it is EXXON's corporate policy that activities not be conducted in a manner that would endanger public health. Similar to the policy of other corporations, the policy statement and adherence to thereof, additionally influences project designs and operational practices.

Finally, the EIS process incorporating public and governmental entity reviews prior to action approval necessitates a description of adequate environmental protection plans, often assumed to include reclamation plans. While it is difficult to accurately perceive the regulatory requirements pertaining to reclamation that may be in effect 50, 25 or even 5 years hence, the basic question brought forward by conduct of the EIS process, i.e., can reclamation successfully be exercised at the Mt. Hope site, can it be addressed and evaluated. In reality, the question must be addressed to assure adequate evaluation of long-term environmental conditions resultant of the proposed action and/or alternatives implementation.

This section documents the evaluation process conducted to define the potential for successful reclamation in the Mt. Hope area. The evaluation test presented represents, in large part, the results of work conducted under subcontract to the third party EIS consultant, WRC, Inc., by ECON Inc. of Helena, Montana. As stated in Section 3.2, it has been assumed that the recommendations presented in the following would be addressed at the time of reclamation to assure appropriate reclamation efforts. It should be noted that the recommendations represent standard operational practices presently familiar to the western mining industry and regulatory entities and in effect demonstrate the relatively favorable conditions at Mt. Hope for design and successful implementation of a reclamation program.

Soils Capability. Technical Report No.5 details the soils conditions anticipated at Mt. Hope relative to reclamation success potential. In brief, the following pertains:

1. Erosional soils losses would not be significant.

2. Calculations indicate a total salvageable topsoil volume for all of the major disturbed areas (excluding rights-of-ways) of nearly 12 million cubic yards. Subtracting stony soil volumes, the resulting salvageable topsoil volume would equal approximately 6 million cubic yards. Six foot topsoil stockpile heights would allow sufficient maintenance of soil productivity.

3. At Mt. Hope, salvage of all of the non-stony soils from the disturbed sites would yield enough topsoil (availability usually being the most limiting factor to reclamation success) to cover the tailings area and plant site with approximately 16.8 inches (43 cm) of topsoil. Thus, after redistribution, more topsoil would be available for plant growth than currently exists at these sites (refer to Table 3-10, Technical Report No.5).

Fertilization Requirements. The application of fertilizers is generally recommended for soils which are deficient in nutrients. As a general rule, soils should be tested to determine fertility status immediately prior to redistribution. The results of such tests can be used to determine potential fertilizer application rates. Ideally, field trails should be conducted to evaluate vegetation responses under various fertilizer rates. This would result in the development of site specific fertilizer application rates.

Soils and spoils from semiarid regions of the western U.S. are generally deficient in nitrogen (N) and phosphorus (P) (Safaya, 1978; Bauer et. al, 1978). Deficiencies in these macronutrients have often limited plant establishment and growth on mined lands (Berg, 1980).

Increased plant production has generally been realized on fertilized mineland (Depuit and Coenenberg, 1979; Packer and Aldon, 1978; Doerr et. al, 1983). Light to medium N application rates (33-60 lbs/acre) with diminishing annual P fertilization rates of 37, 10 and 10 lbs/acre appeared to produce the most favorable balance between stand composition and productivity in southeastern Montana (DePuit and Coenenberg, 1979).

Introduced species tend to respond more favorably to higher fertilization rates than native species (DePuit and Coenenberg, 1979).

Doerr et. al, (1983) in the Piceance Basin of Colorado reported that test plots fertilized with 96 lbs/acre N and 80 lbs/acre P exhibited greater grass production than did unfertilized plots. Production of shrubs appeared to be higher in fertilized plots, while forb production was unaffected by fertilization. The study area received approximately 11.8 inches of precipitation annually, half of which occurs as snowfall (Doerr et. al, 1983).

In a study conducted in the 8 to 12 inch precipitation zone of Nevada on native rangeland, Eckert et. al, (1961) indicated that crested wheatgrass (Agropyron cristatum) responded most favorably to an N application rate of 60 lbs/acre. No responses resulted from additions of Cu, Bo, Mg, Fe, S, Zn or P; Mo and K depressed plant production.

Bauer et. al, (1978) indicated that considerable variability in NO_3 -N levels in stockpiled topsoils complicated sampling for this macronutrient. Levels of P from the same stockpiled soils were relatively uniform. Berg (1980) indicated that soil tests can reliably estimate plant available P levels in disturbed soils. Thus, Berg (1980) suggested the establishment of several 10 foot by 100 foot test strips to evaluate vegetation responses to N fertilization. He indicated that the application of three pounds of ammonium nitrate to each test strip was equivalent to an N application rate of 40 lbs/acre. By incrementally increasing or decreasing the amount of N applied per strip, it is possible to evaluate other application rates. Berg (1980) recommended P application rates of 100 lbs/Acre P_2O_5 on coarse textured soils and 200 lbs/acre for fine texture soils.

In summary, the soils stockpiled at Mt. Hope would be expected to retain much of their original productivity due to the six foot stockpile height limitation and short haulage distances. However, as indicated by the above referenced studies and known soil characteristics at Mt. Hope (e.g., low organic content, substantial weathering, etc.), a fertilization program would be anticipated as being beneficial to but not a requirement of adequate initial reclamation success (establishment of ground cover as detailed by EXXON plans).

Irrigation. Water is the prime factor limiting the successful revegetation of mineland in the arid and semiarid west. Ries et. al, (1978) indicated that irrigation for stand establishment is generally regarded to be a necessity where annual precipitation is less than 30cm (11.8 inches). The Mt. Hope project area is estimated to receive between 10 and 15 inches of precipitation annually, the majority of which falls during the winter months. Hence, during years of drought, it is likely that reclamation seedings would require supplemental watering.

Several benefits accrue from the use of irrigation in mineland reclamation. Of primary importance is the role of irrigation during the critical initial plant establishment phase. Insufficient moisture at that time would result in poor germination and subsequent stand establishment. Failure of the entire revegetation effort may result; thus, necessitating

reseeding of the entire area. In addition to promoting initial stand establishment, irrigation can be used to extend the season of seeding (DePuit, 1980). Doerr et. al, (1983) indicated that supplemental irrigation also increased production of fertilized vs. non fertilized plots. Thus, supplemental water can be used to increase the effectiveness of other cultural treatments.

At Mt. Hope, water would be available for irrigation following the cessation of mining and mineral processing. Once the tailings area has been graded, topsoiled and seeded, a sprinkler system could be constructed to provide water for seedling establishment. This system could be purchased and then perhaps sold to local ranchers after reclamation has been completed. Whether or not such a system would be required would be dependent on annual precipitation received during years of seed establishment. For impact purposes it has been assumed that regardless of delivery method, adequate water would be provided.

It should be noted that the purpose of irrigation is mainly to establish reclamation seedings. Prolonged watering on an annual basis cannot be justified as the purpose of most reclamation efforts is to create plant communities capable of self maintenance under natural environmental conditions. Coenenberg (1982) indicated that excessive irrigation can produce shallow rooted plant communities which depend on large amounts of water for self sustenance. When irrigation ceases, these communities may be unable to survive the subsequent xeric soil moisture conditions.

<u>Mulch</u>. Mulch functions as a temporary soil surface stabilizer, as an effective method to reduce evaporative moisture loss, as a source of soil organic matter and may afford some degree of protection to seedlings from blowing wind and soil particles. Straw and/or hay are most commonly used for mulch in the western United States (Kay, 1978). As a general rule, straw or hay are far less costly and are easier to apply than other mulches which include netting, synthetic emulsions and hydromulches. In the Mt. Hope area, local ranchers would likely be able to provide enough material for use as mulch. Additional mulch could be obtained by harvesting the vegetation which would be growing on the topsoil stockpiles. This material would be superior to agronomic

Table 3-1 Potential Species for Use in Revegetation Seed Mixtures at Mt. Hope

Common Name	Binomial
GRASSES	
Crested wheatgrass[1/]	Agropyron cristatum
Thickspike wheatgrass	Agropyron dasystachyum
Western wheatgrass	Agropyron smithii
Bluebunch wheatgrass	Agropyron spicatum
Pubescent wheatgrass[1/]	Agropyron trichophorum
Smooth brame[1/]	Bramus inermis
Basin wildrye	Elymus cinereus
Sheep fescue	Festuca ovina var. ovina
Indian ricegrass	Oryzopsis hymenoides
Needle and thread	Stipa comata
FORBS	
Alfalfa (dryland)[1/]	Medicago sativa
Yellow sweetclover[1/]	Melilotus officinalis
SHRUBS	
Fourwing saltbush	Artiplex canescens
Winterfat	Ceratoides lanata
TEMPORARY STABILIZERS	
Barley[1/]	Hordeum vulgare
Perennial ryegrass[1/]	Lolium perenne
Sudangrass[1/]	Sorghum sudanense
Wheat[1/]	Triticum aestivum

1/ Introduced species.

Source: WRC EIS Team

mulches as it would contain a variety of mature plants; and thus would provide a supplemental seed source. Care must be taken when using agronomic (for example wheat) mulches as they may afford excess competition and may preclude the establishment of seeded perennial species (Coenenberg, 1982). Therefore, seed free agronomic hay should be used.

Straw or hay mulches are usually applied at rates of one to two tons per acre and are usually applied by commercial mulch spreaders or straw blowers (Kay, 1978). Mulch should be anchored to increase its effectiveness. Crimping, rolling, or chemical tackifiers are most often used to hold straw mulch in place.

As discussed in Technical Report No.5, mulching of the tailings dam face at a rate of two tons per acre would be required to offset the exposed surface water soil erosion losses calculated (48 to 56.2 tons/acre/year). Failure to utilize mulching practices would result in significant soil losses considered unacceptable by EXXON and BLM.

Revegetation Species Selection and Availability. Species utilized in any revegetation effort should be selected based on their adaptability to local environmental conditions. Potential species for use in revegetation seed mixtures at Mt. Hope are listed in Table 3-1. As discussed previously, the BLM cover presently recommended is a mixture of crested wheatgrass, pubescent/intermediate wheatgrass and furrowing saltbrush applied at the rate of six, three and one lbs/acre, respectively (U.S.D.I., 1983). Many of these species are indigenous to the Mt. Hope area, others are introduced species which have been used in rangeland seedings in semiarid environments; all have demonstrated some utility in mineland revegetation (Doeer et. al, 1983; DePuit et. al, 1980; Jensen and Hodder, 1979), and most importantly, seed for all is commercially available. It should be noted however, that these are not the only species which are suitable for use at Mt. Hope. It is likely that during the 50 year life of the mine additional species will be developed and released which will be of equal or superior utility.

An important consideration when obtaining seed for revegetation at Mt. Hope is the origin of seed sources in relation to the intended planting

site. For maximum adaptability, plant materials should originate as near the intended planting site as possible. However, ecotypes moved 400 to 500 km north, or 150 to 200 km south of the point of origin to areas of comparable soils and climate may still perform satisfactorily (Cooper, 1957; in Thornburg and Fuchs, 1978). East and west movements may be similar, depending on changes in elevation and precipitation.

Another important consideration in species selection is the ultimate land use following mining. As much of the local area currently functions as rangeland and provides forage and cover for domestic livestock and wildlife, it would be reasonable to assume that these uses will predominate following the cessation of mining. Thus, species have been selected which will be suitable components of a grassland environment. Following reclamation, the resulting stand of vegetation could increase the diversity of the local environment and provide a grazing resource superior to that which presently exists on the project area.

Temporary Stabilizers. During the revegetation process there is often a period before or shortly following seeding during which soils lack a protective cover and are vulnerable to erosion (See Technical Report No.5). In order to minimize erosion, plant species can be seeded which function as temporary stabilizers. They are temporary in that they persist only long enough to stabilize a given site until permanent seeding can be accomplished; or, they persist only until the permanent vegetation cover has developed sufficiently to protect the site. Temporary stabilizers are short lived, generally, annuals or short lived perennials.

Jensen and Hodder (1979) indicated that temporary stabilizers could be established during the summer provided that the proper species are selected, that seeding is properly time, and that moderate amounts of supplemental water are applied. Species which demonstrated the most favorable germination and establishment characteristics are those which are listed in Table 3-1 as potential species for use at Mt. Hope.

Temporary stabilizers could be seeded concurrently with the permanent seed mixture. However, the seeding date should be late enough so as to

prevent the temporary stabilizers from setting seed. Should this occur, they may provide excessive competition during subsequent years for the species included in the permanent seed mixture (Jensen and Hodder, 1979). The impact analyses conducted for soil erosional losses did not assume temporary stabilization by seeding. As the results of the analysis indicate no significant impacts relative to soil erosion, it would not be anticipated that temporary stabilization would be required at Mt. Hope. Topsoil stockpiles designated to exist for more than one year (for final reclamation) would, however, be seeded for stabilization purposes. The selection of seeding type is, however, not anticipated to emphasize temporary stabilization but long term erosion control (perennial seeds).

Seeding Methods. Seeding methodology is determined by the size of the area to be seeded, its accessibility, slope steepness and seedbed characteristics. Large, gently sloping (3:1 slopes or less) accessible areas, with firm, smooth, rock free seedbeds can be drill seeded. Similar sites, with slopes of 2:1 or less, and with "roughened" seedbed surfaces can be broadcast seeded. Drilling operations plant and cover seed in one step. However, with proper implements, broadcast areas may be seeded and covered in one operation as well. Equally successful results can usually be obtained by either method, especially when broadcast seed has been covered. Hence, the harrowing proposed on sites which would receive broadcast seeding would be considered appropriate as would the seeding along slope contours.

At Mt. Hope the area to be reclaimed will be a large relatively level area. Therefore, either seeding method would likely yield satisfactory results. However, if redistributed topsoils are excessively rocky, then the area to be reclaimed should be broadcast seeded.

Seeding Rates and Depths. Broadcast seed rates are generally one and one half to twice that recommended for drilling; hence broadcast seed costs will be somewhat higher. However, where mixtures of different sized seed are used, broadcasting is superior to drilling in achieving overall stand diversity (DePuit and Coenenberg, 1980). This is attributed to the fact that the various sized seeds are more apt to settle at proper germination depths (as opposed to drilling, which places all seed at a uniform depth). In general,

seeding depth should be increases with seed size. Small seed should be planted one-quarter inch deep, medium sized seed at one-half inch, and large seed up to one inch deep (Wambolt, 1976). The application method assumed by the BLM application rates would be appropriate in the Mt. Hope area.

Season of Seeding. Fall dormant seedings are generally recommended. Seeding during the fall would allow for overwinter seed stratification and may thus increase germination. Also, fall sown seed would already be present to take advantage of winter and spring moisture. Spring seeding may yield results comparable to fall seeding. However, "mechanical" seeding during the spring may be delayed or prohibited due to unfavorable site conditions (i.e., soils too wet).

At Mt. Hope the seeding date could be fairly flexible due to the potential for use of irrigation. However, where practicable, fall seeding would be recommended as the seed could germinate with the benefit of naturally occurring moisture.

Management of Reclaimed Areas. After reclamation seedings have been completed, it would be imperative that they be protected throughout the establishment phase. As a general rule seedings should not be grazed for at least two full growing seasons following seeding (Vallentine, 1977). Therefore, it has been assumed that provisions for fence construction or maintenance would have to be made prior to seeding. Further, once livestock were allowed onto the seeded areas, grazing would be maintained at proper utilization levels. It is likely that reclaimed areas would be more attractive to livestock than adjacent rangeland due to more favorable stand composition and easy access. As a result, the possibility for overuse would exist. The reclaimed area would soon lose its productivity if livestock grazing were not properly managed. While the mechanism for postmining grazing use has not been defined, it has been assumed the land use management would be carried out in a responsible productive manner by any party having land use authority.

Recommendations and Conclusion. The potential for reclamation at Mt. Hope is believed to be good considering current advances in reclamation technology and resources which are available. Adequate supplies of topsoil are available as are plant species which are adapted to local conditions. Coupled with the use of supplemental irrigation, establishment of a suitable permanent stand of vegetation should not be overly difficult provided that the seedings are adequately protected during the establishment phase.

Appropriate consideration regarding necessity of implementation of the following recommendations has been assumed in the impact assessment.

1. Topsoil (A and/or B horizon material) would be salvaged and stockpiled during the two year construction phase. Topsoil stockpiles would be clearly identified in the field and stabilized by the establishment of a vegetation cover as soon as possible.

2. If necessary, a program would be conducted during the mining period to evaluate various plant species, seed mixtures and rates, revegetation methods, amendments and vegetation responses for different topsoil depths. The results of the program studies would provide data from which a site specific reclamation plan could be formulated.

3. If deemed necessary, an irrigation system would be developed to provide supplemental water which would greatly improve the chances for successful stand establishment in the event of drought periods.

4. Stockpiled topsoils would be tested prior to redistribution in order to determine fertility status. As necessary, a fertilization program would then be defined and implemented.

5. The proposed planting of pinyon-juniper in the tailings pond area (Section 2.7.1.3, Mt. Hope EIS) would be evaluated further prior to initiation of planting. This recommendation

is presented relative to the fact that the pinyon-juniper type has been increasing throughout the Intermountain Region and encroaching into more productive range types. In consideration of the effort which would be expended to establish a grassland type at the tailings site and the relative abundance of the pinyon-juniper type in the vicinity of Mt. Hope, the planting of pinyon-juniper would not be recommended or considered desireable. The planting of pinyon-juniper or not planting of it would not alter the impact analysis conclusions presented herein.

3.5 Fauna Habitat/Population Losses

Impacts to fauna utilizing the affected lands of the Mt. Hope project would occur through habitat loss, direct mortality, displacement of population and avoidance and/or harm brought about by the increased human population.

3.5.1 Habitat Loss

As outlined in Section 3.2, it has been assumed, as necessary, that essentially all of the area within the Mt. Hope project boundary (up to 10,000 acres) would undergo "disturbance"; disturbance being defined for analytical purposes as "effective area of disturbance" and not necessarily connoting actual physical disturbance. The effect of such disturbance assumed in this case for individual faunal populations, is described in the following subsection. Actual habitat affected is discussed in the following paragraphs.

In excess of 6,854 acres of habitat would undergo direct disturbance activity within the Mt. Hope land acquisition area (mine pit: 695-700 acres; non-mineralized material storage areas: 2,400 acres; tailings pond 4-A: 3,460 acres; evaporation pond: 164 acres; plant site and auxiliaries: 100 acres; site access road: 30 acres). As indicated by Figure 1-3, the project components requiring direct land surface disturbance would be located centrally within the land acquisition with up to 1,800 or more acres serving as buffering

acreage (Table 2-24, Mt. Hope EIS). Approximately 300 plus acres would be considered directly affected as the location of such lands between component action areas would effectively preclude significant faunal use. In addition to the acreage affected directly within the land acquisition area, the development of rights-of-ways would affect up to 276 acres although the land affected would be linear in nature versus the block disturbance effect within the land acquisition area.

Permanent habitat loss would total in excess of 3,100 acres as the mine pit and non-mineralized material storage areas would not be subjected to reclamation efforts. Although vegetational growth may occur over the long-term period, such growth would be extremely limited and be of little or no value to area faunal populations. The habitat losses within the other areas of project activity would be replaced, over time, by the establishment of reclaimed lands. Qualitatively, the replacement of habitat type would be altered, particularly in the areas of ridge sides hosting rock outcrops, crags, etc., which would eventually be inundated by tailings material. However, successful revegetation would promote added diversity of forage and the erosional protection measures planned along the tailings pond perimeters would promote a diversified topographic boundary conceivably similar to stream embankments (resultant of undisturbed surface water runoff channel reconstruction).

The long term habitat loss within the mine pit area and non-mineralized material storage areas would entail the elimination of approximately 2,439 acres of pinyon-juniper/sagebrush and 1,001 acres of big sagebrush type habitat. As discussed previously, the two vegetation types predominate in the region; the loss of which would not be significant in terms of regional or area productivity. On a localized basis (specific to Mt. Hope faunal use patterns), the loss of habitat would result in certain unfavorable faunal reactions (e.g., mule deer migratory routing nearer to State Route 278) which are discussed in the following subsection.

Vegetational areas of critical habitat value were not identified as being affected by or proximal to the proposed action. As such, no impacts were associated with critical habitat loss via vegetation removal.

A portion of the non-mineralized material storage area on the north slope of Mt. Hope supports a unique project habitat area which consists of curlleaf mountain mahogany (Cerocarpus ledifolius) and other important browse plants. Within the project area, this vegetation type is only found on Mt. Hope itself. However, there are additional stands on Roberts Creek Mountain. Paulsen (1975) indicated that mountain mahogany should be where it occurs within the pinyon-juniper type as it (mahogany) is an important nutritional component of deer diets. As mule deer were observed on the north side of Mt. Hope during a WRC field reconnaissance it can be assumed that the mountain mahogany area is important to resident/migratory deer, the loss of which would result in probable population displacement (worst-case). In general, habitat for mule deer and wild horse on site would be essentially lost (short term) and an undefined area of habitat outside of the site may be avoided by deer, horses, raptors and other species because of the high degree of human activity and noise from blasting and heavy equipment.

Of the SHFs (Special Habitat Features) noted on site during BLM investigation, 12 of 16 SHFs would be wholly or partly affected by tailings material inundation or dam construction. Essentially all of the SHFs disturbed would involve man-made structures (B-code, Figure 2-7; buildings, pipeline, railroad, etc.). The edges of the rock and boulder outcropping (A-41 code, Figure 2-7) bordering Tyrone Gap would be affected by tailings dam construction. The linear nature and areal extent of the outcrop SHF effectively limits significance of the anticipated impact although localized faunal avoidance would be expected. Of the areas affected, two areas represent potential habitat for peregrine falcon.

It has been assumed that spring associated habitat, particularly that associated with McBride's Spring (proximal to State Route 278 relocation alignment) would be protected. Undefined wildlife habitats of 150-200 acres for off-site housing would be lost.

Relative to rights-of-way habitat impacts, significance has been primarily assessed concerning sage grouse strutting grounds and nesting areas. Detail for each corridor assignment (proposed action/alternatives) is presented in the following subsection. Little differentiation of other-species habitat

loss is known with the present data base; impact assessment has assumed effective corridor-method mitigation (i.e., route realignment for avoidance) should unique habitat(s) be encountered which have not presently been documented. The potential for such presence is considered to be limited, probably within small areas of water pooling, rock outcropping, etc.).

3.5.2 Fauna Population Impacts

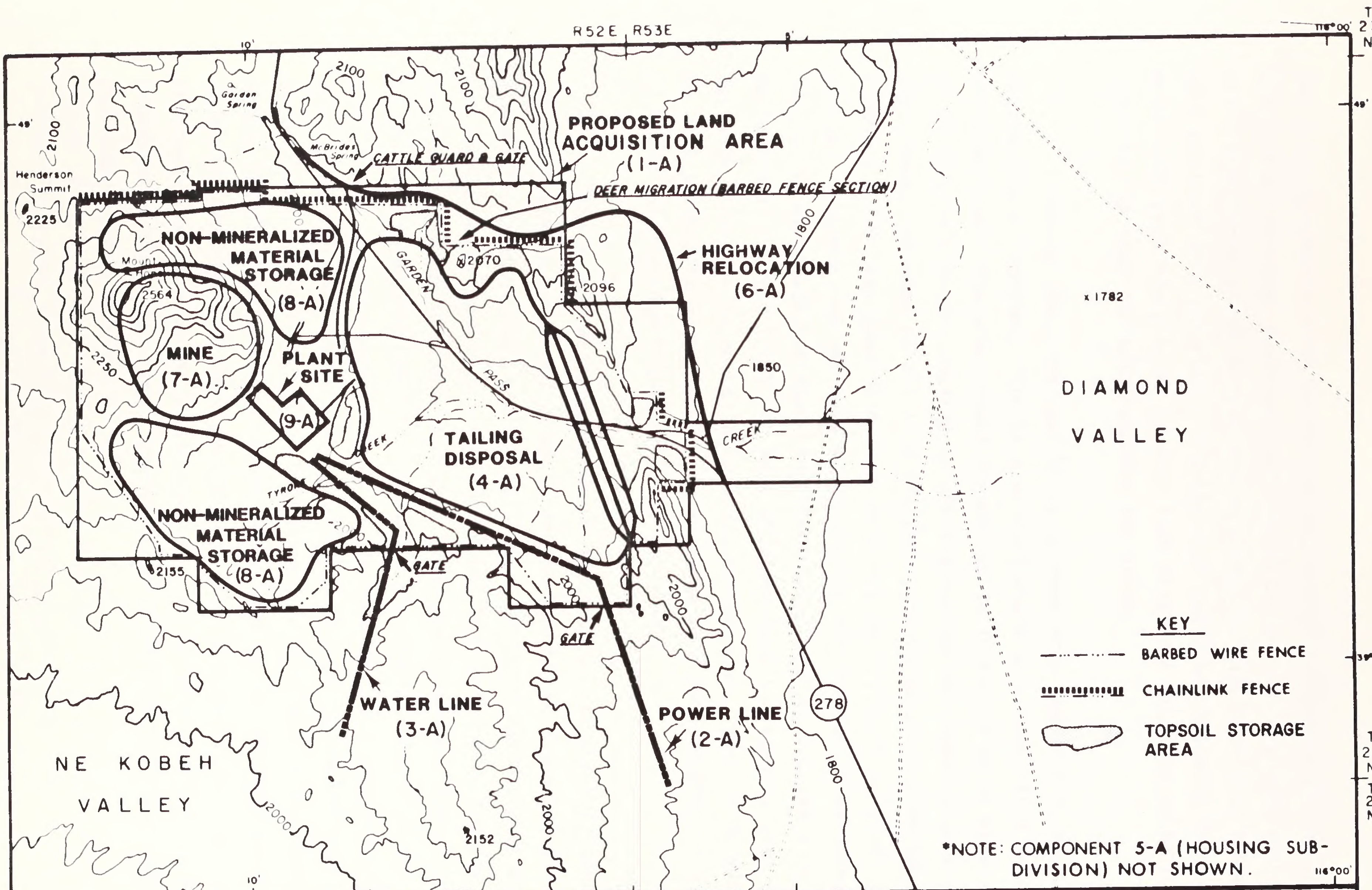
Analysis of impacts to fauna emphasized a number of species expressed as being of interest to governmental and public entities and individuals. Beyond including consideration of federally or state listed threatened or endangered faunal species (Section 3.6), it was deemed appropriate to investigate the potential for impact upon a number of species, including; sage grouse (strutting grounds criteria), mule deer (migratory path criteria), and wild horses (grazing competition with livestock and area use patterns criteria).

Mule Deer. Potential effects on deer populations would be related to the following: interference with migratory routes; increased poaching; increased road kills; loss of grazing land; and death or injuries on site. Potential injury from possible toxic materials in the tailings ponds would not occur because area access would be restricted by project component obstacles and chain-link fencing and because available information on tailings pond effluent indicates low toxicity potential.

Operations within the Mt. Hope site were primarily assessed as to potential for interference with three known important migration routes of mule deer across the project site (Figure 2-7) (Nevada Dept. of Wildlife, 1983). Presence of the project, even if it were to be totally chain-link fenced, would not prevent this movement of deer but would shift their paths.

The Nevada Department of Wildlife has suggested that fencing be conducted in a manner allowing a migration route detour to the east of the proposed tailings pond and west of Tyrone Gap. Figure 3-1 illustrates the proposed fencing plan developed to date by EXXON.

With present fencing plans animals moving across the east end of



MT. HOPE MOLYBDENUM PROJECT

FENCE AND TOPSOIL STORAGE PLANS

U.S. Department of the Interior
Bureau of Land Management

FIGURE 3-1

the site are likely to be pushed further east onto Diamond Valley and State Route 278. Although some deer may locate the one-quarter mile break in the chain link fence on the northern site perimeter (and thus pass through the site and away from the road), a worst-case analysis indicates that approximately 200 deer would be at greater risk from road kills by being forced close to the road for approximately two miles.

During 1983, two road kills of deer were reported to the NDOW in Eureka County; however, this is a minimum since many road kills go undetected or unreported. The area around Tyrone Gap is likely to be of greatest concern since this is a major crossing of the highway during summer/winter ground migrations. As many as 500 to 1,500 deer (County population estimated at 4,000 to 4,500) may pass this area twice a year for a two to three week period. A worst-case estimate would involve the loss of 10 deer/year due to road kills and would increase proportionate to traffic increases to 280 deer. Because there is not likely to be a straight line increase, a more reasonable, but high, increase in mortalities would be 140 deer. Present baseline traffic in vehicles/day is estimated at 200 compared to a peak construction estimate of 2,900 vehicles/day (Table 4-8, Mt. Hope EIS).

Impact migration measures of importance, not assumed relative to the worst-case anaysis described above, do exist. As discussed in Chapter 2.0 of the Mt. Hope EIS, a mitigation plan involving EXXON coordination with the Nevada State Department of Wildlife and BLM relative to fencing location, has been suggested with the objective being the reduction (upon implementation of planning recommendations) in potential for impact associated with migration route blocking. Although it would be expected that the need for migration routing near State Route 278 would continue to lead to an increase from baseline in road kill frequency, further mitigation coordination (e.g., widening the linear extent of barbed wire versus chain link fence) between EXXON and the Department of Wildlife could result in a limited significance of impact. (Although not incoporated in the analysis, it is anticipated that EXXON may implement a van pool/busing schedule which would also lead to a significant reduction in road kills).

An unquantified number of injuries and deaths, considered minor compared to road kills, would occur on site as the result of deer/vehicles collisions. There will also be an increase in deaths and harassment from increased ORV activity. No estimate of this effect is possible.

Of the lands within the acquisition boundary area, approximately 80 to 90 percent is estimated to have deer grazing potential. Although there are presently likely to be some deer on site most of the year, the primary use of the area appears to be as a migratory route between summer and winter grounds. A worst-case analysis assumes an 8,000 to 9,000 acre loss of habitat and food supplies for the life of the project. If deer were to utilize this area on a year-round basis, this would amount to the loss of 400 to 450 deer carrying capacity, assuming food and Mt. Hope-type habitat availability is limting deer populations. A more reasonable estimate of loss, considering the qualitative judgment that the site is not used to capacity on a year-round basis, is a loss of carrying capacity for up to 40 deer.

The large increase in human populations from construction/operation workers and their familes could result in a significant increase in illegal deer kill. The present legal harvest for Management Area 14 has ranged from 788 to 1,183 (1978-1983) animals. An estimated 80-100 animals may be additionally taken as the result of increased poaching.

The implementation of either tailings pond Alternates 4-B or 4-C would result in insignificant and significant impacts, respectively, to mule deer migratory routes. Alternate 4-B, located in Diamond Valley, would present no impact to mule deer populations or migration. Alternate 4-C, appropriately fenced (e.g. chain link enclosure) would present an obstacle of low significance to migration. No significance relative to mule deer populations and migration were determined relative to the alternatives of power line, water line, or housing.

Sage Grouse and Other Upland Game Species. The primary species considered under this category are sage grouse, chuckar, dove, and cottontail rabbits. Direct effects will be from loss of habitats on site and possible deleterious effects of access to tailings pond water. Indirect effects will be from an

increase in legal and illegal hunting pressure, possible loss of water areas in Kobeh Valley from groundwater drawdown, increased road kills, increased harrassment or avoidance of areas because of greater human presence and ORV activity, and the presence of power poles near leks that may be used as hunting perches for birds of prey.

Sage grouse are considered to be a significant resource by the Nevada DOW and are sensitive to environmental disturbances. Habitat losses from direct impacts include the site proper and power and water rights-of-ways. Grouse may use the flatter portions of the site for foraging and this area would become unavailable habitat. A worst-case analysis assumed 6,000 acres of forage habitat would be lost. There are no key habitats known on the site (strutting grounds, brooding or wintering areas).

Power line Alternate 2-A (proposed action) would pass the furthest from known strutting grounds (see Figure 2-5), but would still be within approximately one mile of three known areas in Diamond Valley and within two miles of two other known areas. The Nevada DOW estimates that construction activities and major roads may negatively impact leks closer than a mile or less, although four of the leks are presently within a mile of State Route 278. A worst-case analysis is that the four closest leks would be abandoned as the result of increased traffic and construction on the power line. If abandoned, it is possible that they may be reinhabited after the construction period; however, this is not a surety (thus the worst-case assessment that four leks would be abandoned). The loss would represent approximately 29 percent of the potential lek areas identified on Figure 2-5, (portions of Diamond and Kobeh Valley) and approximately 14 percent of the leks known in Kobeh Valley (HDR, 1980). (In a December, 1970 memorandum of understanding between the Nevada Department of Fish and Game and the BLM, discussion was formalized concerning appropriate determination of habitat and use areas significant to sage grouse populations. The BLM currently recognizes a two-mile perimeter area of interest near sage grouse strutting grounds as the perimeter two mile area is often significant to nesting establishment. The two-mile perimeter factor has been incorporated into impact assessments determining area of project impacts as well as NDOW criteria.)

This impact is considered a significant adverse loss. The Nevada DOW considers that there is very little movement between leks and if a lek is abandoned because of disturbances, the population has a high probability of being lost. This result is possible but not a surety. Higby (1969) and Stoecker (1984) believe there is some reestablishment of populations if suitable alternate lek sites can be found or if the disturbed lek returns to an undisturbed state. A key factor in lek choosing may be the nearness of suitable wet areas for brood rearing. Assumedly these areas are presently near the lek areas, but their locations have not been established.

A less severe assessment involves the consideration that two of the closest lek areas would be abandoned; the population of one of these would reestablish another lek and the population of the other would be lost. This would mean the short-term (one year) loss of one breeding population and the long-term loss of another population.

The center water line route and well field is not known to be near any key habitat for the sage grouse. However, the western edge of the proposed water line corridor borders the sage grouse strutting grounds indicated in Sections 10, 11, and 15 of Township 21 North, Range 51 East (Figure 2-5). The eastern edge of the corridor, however, is approximately 2.5 miles distance from the nearest border of the sage grouse strutting grounds. Additionally, the northwestern border of the southernly located non-mineralized material storage area 9-A is within 0.75 mile of a sage grouse strutting ground (due west) (Figure 2-5). If water withdrawal affects the availability of surface water near leks in Kobeh Valley, this could also have a serious affect on broad areas. There are presently 29 known leks in Kobeh Valley (HDR, 1980).

Alternative power line route 2-B would traverse two sage grouse strutting grounds in Diamond Valley. As such, implementation of the alternative would be considered a significant adverse impact unless confirmation of negligent site value can be obtained. On a worst-case basis, the two sage grouse strutting grounds traversed as well as three adjacent but undistrubed land sage grouse strutting grounds would be lost (Figure 2-5). The loss would, on a worst-case basis, eliminate all but one of the existing West Diamond Valley strutting grounds.

Power line Alternate 2-C would also traverse two sage grouse strutting grounds in Diamond Valley. Direct ground disturbance (power line construction) would result in loss of nesting habitat similar to Alternate 2-B. Thus, the impact of implementing either Alternate 2-B or 2-C was determined as significantly adverse.

Alternate water line 3-B would pose identical impacts to that defined for the proposed action. Alternate water line 3-C would pose significant adverse impacts to the regionally important sage grouse strutting grounds and nesting areas located proximate to the well field (Figure 2-6). In 1983, the sage grouse strutting ground located in Sections 35 and 36, T23N, R50E, more than 40 birds were observed strutting. Although subject to a vegetal control program which may effectively eliminate the sage grouse values within the area, the grounds are presently considered as regionally significant, the loss of which would be considered a significant adverse loss. A total of four sage grouse areas would be lost on a worst-case basis.

No significant impacts were associated with tailings pond Alternate 4-B. Loss of AUMs would occur but is deemed insignificant relative to the regional basis of comparison. The northwest border of tailings pond Alternate 4-C is approximately 0.75 miles south of a sage grouse strutting ground. As such, determination of a significant adverse impact on a worst-case basis is warranted. The implementation of Alternate 4-C would additionally result in a conflict with existing livestock seeding.

Indirect effects of the power transmission line route include possible use of power structures as hunting perches for golden eagles and hawks that may prey on and disturb grouse in the lek areas. If the leks closest to the power poles were abandoned, this effect would not occur; if these leks were not abandoned because of construction and traffic reasons, the additional harrassment from birds of prey with a hunting platform nearby may lead to abandonment. In cooperation with the NDOW, it is planned to place power poles to minimize their use as a hunting perch for lek predation. A worst-case analysis, however, involves the loss of one strutting ground.

Increased ORV use locally and regionally could potentially be more significant than direct project effects. Grouse populations would be particularly vulnerable during the strutting and brooding season when disturbance from ORV's could lead to a significant loss of young of the year.

An increase in human population from construction and operation workers would result in increased legal and possibly illegal hunting. Presently, the sage grouse season is only seven days with a bag limit of two per day or four total for the season. In Eureka County, the number of hunters recorded (D. Elliot, NDOW, personal communication, 1983) ranged from 203 to 574 per year during the 1976-1980 period and total birds harvested ranged from 830-1,865. An unknown number of birds were also illegally taken and not reported. Of the 940 construction workers, it is reasonable to assume that 25-50 percent would be potential grouse hunters, which would increase the number of hunters in Eureka County by 50 to 200 percent, depending upon the year. The net result would be a greater harvest of sage grouse and/or a lower hunter success ratio. A proportional increase in poaching could also be possible. It should, however, be noted that although it has become a relatively standard practice to predict substantial increase in the illegal taking of game species (or killing of non-game species) as a result of industry related population increases, such is not always the case. In Grant County, New Mexico, the incidence of poaching during the period 1980 to 1983 was inversely proportionate to the employment opportunities associated with the significant mining industry base. The incidence of poaching, as well as non-game killing, in the Gila National Forest and Silver City area was considered to be related to high unemployment levels and economic hardship brought about by the recessionary economy. It was anticipated that increased employment opportunities (mining or other industry) would decrease the incidence of poaching and non-game shooting (R. Carson, District Superintendent, Gila National Forest, personal communication, 1983).

Relative to chuckar partridge, little is known of populations on site or along the rights-of-ways. ORV harrassment, loss of on-site habitat and increased predation by human populations would all be likely to occur. During the 1976-1980 period, total reported hunters in Eureka County ranged from 230 to 889 per year with a total harvest of 896 to 7,538 birds. An

assumed increase of 235-470 hunters (25 to 50 percent of construction force) would result in a 30 to 200 percent increase in hunting pressure depending upon the year. Since the bag limit has increased during the 1976-81 period while the total harvest has also increased, it is assumed chuckar populations in the county are increasing. A greater number of hunters would result in a greater harvest both legally and perhaps illegally, and/or a reduced bag limit and hunter success ratio. Effects under the alternative cases for chukar and dove (see below) were determined to be similar except that under the decentralized workforce scenario, percent increases in hunting pressure and success would be expected to decrease proportionately with the population base at about a two-thirds rate (i.e., some residents of Elko County would still be expected to hunt in the Eureka County area).

Dove nesting on the Mt. Hope site is considered likely but numbers are unknown (D. Elliot, NDOW, personal communication, 1983). County-wide there are fewer number of hunters (107 to 195) than for grouse or chuckar although the total number of birds harvested is similar (897 to 2,784 annually during the 1976-1980 period). A 25 to 200 percent increase in hunting pressure is predicted, depending on the year. This would result in a greater harvest or a lower bag limit and hunter success ratio if populations declined.

It is possible that more birds would utilize the site during operation than at present, being drawn by the accessability of tailings pond water. Under the consideration that there is no toxicity of tailings pond effluent to birdlife, the availability of water may improve the abundance and local distribution of dove.

Raptors. Golden eagles and hawks are species of special interest that may be affected directly or indirectly by the project. Golden eagles are protected under the Eagle Protection Act and in particular the swainsons and ferruginous hawks are species of Nevada State concern and are presently being considered as candidate species.

There are five potential sources of impact on these species: 1) loss of habitat for nesting, perching or feeding, 2) loss of prey species from project effects on prey species, 3) increased illegal shooting of birds

of prey, 4) deaths from increased road kills, and 5) deaths from electrocution from new power lines.

New power lines would be designed to prevent electrocution of large birds and would not have any impact. This mitigation measure is considered important since at least six birds were killed by electrocution in 1983.

Road kills of golden eagles, however, can be expected to increase. Presenty there is a significant loss of golden eagles (seven road kills in 1983) and increased traffic can be expected to result in additional, but unquantified, losses.

Loss of habitat for nesting and perching of raptors on or near the site would probably not be significant, although no site-specific studies have been carried out to determine raptor use. A swainson's hawk was observed near site in 1983 and there is a known golden eagle nest approximately one mile south of the site. On a worst-case analysis basis, all nesting and hunting within one mile of the site would be considered lost for the short-term. The golden eagle may or may not habituate to activity and return or not leave its nest. No effects on bald eagles are predicted.

Loss of prey species as a result of project activity, ORV and other human activity is not considered to have a significant effect on raptor populations because of the large area in Diamond and Kobeh Valleys available for hunting. However, since raptors commonly hunt within a certain distance around a nest site, severe local losses of prey could affect individual birds or cause them to move their nesting area.

Relative to alternatives selection, impacts to raptor population were deemed insignificant but in scale of extent exceeded that of the proposed action. Specifically, both tailings pond Alternates 4-B and 4-C would pose attractive similarities to lake or water bodies removed from central mine operations. While avoidances of the proposed tailings pond would be expected due to the close proximity of the ongoing mine operations, such avoidance would probably not occur at Alternates 4-B or 4-C due to distance and topographic barrier from mine site. While the tailings effluent has been

characterized as non-toxic (EPA toxicity test criteria) commonly accepted criteria deem it undesireable that fauna be attracted to operational components as artificial habitat or use areas.

Wild Horses. The primary sources of effects on wild horses would be a restraining of movements through the site, loss of feeding area, loss of one water source on site, and potential loss of water sources in Kobeh Valley from well drawdown.

Restriction of movements through the site is considered of minor concern to horses. No definitive summer/winter migratory paths have been identified although horses utilize the site. Animals that presently cross the site would encounter the same problems as mule deer. Animals going to the west would be forced close to Highway 287 which may result in road kills. At present, known road kill of wild horses is not a significant problem. Only one horse in three years has been reported as a road kill however, an unknown number may be unrecorded (D. Elliott, NDOW, personal communication, 1983) (carcass disposal not conducted by agency). Increased traffic would result in an increase in road kills of unknown magnitude. A worst-case would be an additional five road kills per year during construction corresponding to the increase in average daily traffic. Upon implementation of the proposed speed limit reduction, the increase in road kills would be expected to be reduced significantly.

Wild horses have a small population (10-12 known from the Mt. Hope area) near site and additional numbers may periodically utilize the area. The loss of the site for foraging would reduce the range of horses but may or may not limit forage availability. BLM policy is not to allow unlimited expansion of horse populations and loss of the site area is not likely to significantly affect populations below BLM recommended levels.

The potential exists for increased movements between the Herd Use Areas (HUAs) if EXXON removes the existing allotment boundary fence without appropriate relocation. Increased movements may also occur when gates in the existing fence are left open to accommodate vehicular traffic across the boundary. Therefore, a potential does exist for significant increase in

numbers of wild horses in the Romano Allotment. Upon implementation of the proposed project area an impact may result from wild horses being located on private land. Section 4 of the Public Law 92-195 (PL 92-195) states:

> "Section 4. If wild free-roaming horses or burros stray from public lands onto privately owned land, the owners of such land may inform the nearest Federal marshall or agent of the Secretary, who shall arrange to have the animals removed. In no event shall such wild free-roaming horses and burros be destroyed except by the agents of the Secretary. Nothing in this section shall be construed to prohibit a private landowner from maintaining wild free-roaming horses or burros on his private lands, or lands leased from the Government, if he does so in a manner that protects them from harassment, and if the animals were not willfully removed or enticed from the public lands. Any individuals who maintain such wild free-roaming horses or burros on their private lands or lands leased from the Government shall notify the appropriate agent of the Secretary and supply him with a reasonable approximation of the number of animals so maintained."

As such, Section 4 provisions would be followed to mitigate wild horses and public land ownership conflicts.

Under the alternatives investigated, impacts to the HUAs would be similar to that described for the proposed action (impacts being associated with land acquisition area closure).

Antelope. The primary sources of effects on antelopes would be similar to those listed above for wild horses but would include the effects of increased hunting pressure and possible poaching.

Antelope do not use the Mt. Hope site on a continual basis, although there is a small herd north of Mt. Hope. On this basis, loss of the site as habitat and restriction of movement are not considered significant to area

antelope herds. Possible loss of watering areas from drawdown in Kobeh Valley could be significant in limiting antelope range, since water is needed at intervals of 105 miles. At present, the significance of this cannot be evaluated.

Antelope in the Shoshone-Eureka Management Area may be subject to increased poaching similar to deer; however, the legal take will not be increased since there are presently more applicants than permits. Increased traffic would result in an increase in road kills of unknown magnitude, although very few such kills have been recorded over the last several years (D. Elliott, NDOW, personal communication, 1983).

Waterfowl. Potential effects on waterfowl are likely from two sources: illegal hunting and potential for toxic effects of the tailings pond effluent. Although presently the site and immediate surroundings are not attractive to waterfowl because of the lack of pond and wetland areas, the site is within the high plains portion of the Central Flyway, major waterfowl areas are known to the south and east and west (MX-ETR-15, Figures 1.1-8 and 1.3.3.1-7 (HDR, 1980)), and the presence of a tailings pond would depend upon pond depth and clarity, slopes of sides and water quality affecting plant growth.

Worst-case analysis for waterfowl would be the growth of significant quantities of plant life in the pond as a source of food and the potential for ingestion of any, if any, toxic elements in the water and plant life by waterfowl using the pond. An estimated 100-500 waterfowl are predicted to utilize the pond annually (D. Elliott, NDOW, personal communication, 1983). Although birds would be attracted by the water but may be repelled by the nearness of machinery, noise and human activity, half of the birds attracted may suffer significant sub-lethal or lethal effects.

Less than worst-case analysis is, however, predicted by the work of Thompson (1977), EPA analysis of site materials, and the predicted water quality of the ponds. Based on this information, no toxicity to waterfowl is predicted from utilization of the tailings pond. Additionally, the use of nylon wire strung with flags across the pond could substantially reduce its use by waterfowl.

Mortalities from illegal shooting of waterfowl on the tailings pond is considered to be nil because EXXON would not allow the discharge of firearms on site. However, an increase in waterfowl hunting can be expected in Eureka and surrounding counties. Approximately 1100 ducks were harvested in Eureka County in 1979, which was approximately one percent of the state harvest. Waterfowl abundance for the state is considered "intermediate" in Diamond and Kobeh Valleys (HDR, 1980).

Some mortalities (unquantified) can also be expected from collision of waterfowl with powerlines near the pond; however, the total losses are not considered to be significant.

Furbearers. The prime furbearers on site or in the vicinity of Mt. Hope are bobcat, coyote and fox. Species requiring more water (beaver and muskrat) are not common in the area. The following indicates the numbers of furbearers taken in Eureka County followed by the percent of state harvest.

Species	Eureka Harvest	Percent of State Harvest
Coyote	575	4.1
Bobcat	212	5.6
Gray Fox	10	1.1
Kit Fox	0	0

All of these species are likely to occur on site, although their population abundance is not known. Trapping of bobcat and coyote are known to have occurred on site.

Effects of the project on furbearers would be elimination of the 10,000 acre site as habitat and a prey source. Because specific data are not available, a worst-case analysis assumes the habitat loss would equal less than one percent of all furbearers (assumes 50 percent of county acreage available for furbearer use; in reality up to 90 percent or more of county lands may be utilized by furbearers). Increased pressure from hunting and trapping will also occur proportional to the increase in population. In the immediate Eureka area, this would equal approximately a 4-fold increase. The

combined effects are considered minor on a country-wide basis but significant in the immediate area.

Other Small Game. Effects on other small game, such as cottontail rabbits, will be related to increases in legal and illegal hunting pressure, road kills, and ORV harrassment and destruction of habitat. These effects have not been quantified except that hunting pressure is predicted to approximately double to quadruple in the Eureka area for the average year.

Non-Game Wildlife. All habitat has been assumed to be lost in the mine site area for the life of the project and until revegetation is completed. Quantitative evaluation of species and population densities on site are not available.

Non-game wildlife off-site will be negatively affected by increased human presence, increased ORV use resulting in direct mortalities, harrassment and habitat destruction, and possibly by loss of available surface water in Kobeh Valley as the result of groundwater drawdown, and an increase in road kills. These combined factors would reduce populations of non-game wildlife and predators, and would have a mixed effect on carrion eaters.

The loss of the Mt. Hope site non-game habitat and other effects would be significant on a site-specific basis, extending into proximate areas. Regionally, the combined effects on non-game wildlife is not considered significant.

3.6 Impacts to Rare, Endangered and Threatened Species

With present knowledge there are no known unique species, assemblages of species, or unusually productive habitats on site that will be affected by the project. No unique regional wildlife resource is known to be potentially affected.

Based on a review of habitat characteristics, lack of visual observation during on-site reconnaissances (May, June, July, 1983) and discussions with BLM fauna biologists, no significant potential was identified for the presence of threatened or endangered species.

Therefore, no impacts have been identified for rare, endangered or threatened species. No such floral or faunal species are known to exist in the areas affected by project implementation (see Section 2.4). A vegetation reconnaissance survey of the lands within the Mt. Hope site study area in 1983 did not result in the observance of particularly unique species. No threatened or endangered species were observed during the late July, 1983 field survey. Specimens which were especially reviewed at the time of the late July trip (although field conditions involved dessicated vegetation due to the summer survey period) were determined not to be among the four most probable Eureka County species listed by Monzingo and Williams (1980). One individual sample examined further as potentially being Clokey pincushion cactus (Coryphantha vivipara) was a member of the genus Opuntia. One-leaflet Torrey milkvetch (Astragalus calycosus var monophyllidus) was not observed on the Mt. Hope area; other members of the genus Astragalus were found. Watson oxythecal (Oxytheca watsonii) and Lepidium nanum, a mustard, were not observed.

Records of plant observations in Eureka County were reviewed to assure consideration of known locations with the result being that no plants listed as candidate threatened or endangered were recorded as being in the vicinity of the Mt. Hope site study area.

Relative to proposed and alternative rights-of-way alignments, no impacts have been identified pertaining to rare, endangered or threatened species. While recorded data do not indicate significant potential for such occurrence, the determination of no impact is primarily based on the assumption that effective corridor method mitigation, if required, would be conducted. Specifically, on-site forward work would proceed construction activity to assure the opportunity for route realignment, as necessary and if necessary.

3.7 Wilderness Study Area Impacts

An analysis of the potential impacts of industrial activity in the vicinity of the Roberts Wilderness Study Area was completed by the Bureau of Land Management (Shoshone-Eureka Resource Area) in June of 1983 and is included in the Final Shoshone-Eureka Resource Management Plan and Environmental Impact

Statement (1984). In accordance with the CEQ concept of tiering, the analysis is incorporated by reference.

The analyses of industrial activity impacts presented in the RMP/EIS were generally limited to ongoing and potential mining/ranching activity in the immediate area of the Roberts WSA. The RMP/EIS did include analyses of land use tenure position adjustments which would affect the resource values of the entire Shoshone-Eureka management area, including the criteria value of the Roberts WSA.

In terms of land use, the Mt. Hope land tenure adjustment was determined to satisfy the preliminary criteria of resource utilization. The analysis included the evaluation of potential use conflicts. (See Technical Report No.8).

The following details in summary form other environmental analyses (e.g., noise, visual resources), the results of which are pertinent to an evaluation of wilderness area impacts.

3.7.1 Evaluation of Potential for Mt. Hope Project Impacts Upon Wilderness Value Criteria

The Shoshone-Eureka Wilderness Technical Report (U.S.D.I., 1984) included a detailed review of several criteria evaluation points concerning the adequacy of the Roberts Wildnerness Study Area (NV-060-541) for proposed designation as a wilderness area. The following reviews the criteria decisions as potentially affected by the Mt. Hope project.

Size. The Mt. Hope project, if implemented as the proposed action and/or alternatives, would not affect the total number of acres within the Roberts Wilderness Study Area (WSA). Its present size of approximately 15,090 acres would not be affected in any manner as the Mt. Hope boundaries do not extend into the WSA.

Naturalness. The Mt. Hope project would not require the establishment of human imprints as represented by ways, fencing or mining developments.

The Mt. Hope activity would not represent a major noise or visual source affecting the wilderness experience (Sections 3.7.2 and 3.7.3, respectively).

Solitude/Recreation. The abundant natural screening of the WSA would not be affected by Mt. Hope activities. Effects upon availability of secluded spots would not be quantitative, although unmanaged visitation could reduce the qualitative ratio of simultaneous land:visitor ratios. The outstanding opportunities for primitive and unconfined recreation provided by the WSA unit would not be affected by the Mt. Hope project activity.

Special Features. The special WSA features of ecological diversity and terrain would not be affected by the Mt. Hope project activity.

Multiple Resource Benefits. The Mt. Hope project activity would not affect the multiple resource benefits brought about by Wilderness Area designation; specifically, 1) limitation of surface disturbance and associated watershed and water quality benefits; 2) added protection of wildlife species; 3) protection of visual resources by limitation of development inside the unit; and 4) reduced disturbance of cultural resources.

Diversity in the National Wilderness Preservation System. The Mt. Hope project activity would be considered not applicable to the consideration of the WSA's value as a item of diversity in the National Wilderness Preservation System. The WSA, even if other mining were to occur within the land boundaries of the WSA, would still contribute to vegetational, recreational and geographic distribution diversity required by the National Wilderness Preservation System.

Manageability. The direct impacts associated with the Mt. Hope project would not affect the short-term or long-term manageability potential of the WSA. Indirect effects would be expected to extend the requirements of managing entry ways to preclude four-wheel vehicle use (e.g., the population increase associated with the Mt. Hope project would be expected to also result in increased visitation of the WSA).

Quality Standards. None of the six quality standards assessed relative to WSA wilderness value would be affected by the Mt. Hope project activity. The quality standards assessed were: 1) energy and mineral resource values; 2) impacts on other resources; 3) impacts of nondesignation on wilderness values; 4) public comment; 5) local social and economic effects; and, 6) consistency with other plans.

One category of assessment under the category of Standard No.2, Impacts on Other Resources, was especially evaluated relative to the indirect effects of the Mt. Hope project. As detailed in Section 3.3, an increased area demand for Christmas trees would be expected as a result of the increased population residing in the Eureka area. As the use of lands within the Mt. Hope acquisition boundary area would eliminate up to 10 percent of the Resource Area's present harvest, it has been assessed that other areas available for harvesting but presently inaccessible would be utilized for demand fulfillment, with or without authorization. However, as it was assessed in the Shoshone-Eureka Wilderness Technical Report that no present demand for woodlands products existed in the WSA and that there were sufficient quantities of woodland products outside the boundary of the unit to meet all foreseeable demands, it has been determined that the Christmas tree harvest activity associated with implementation of the Mt. Hope project would not necessarily impact the Roberts WSA or alter impact levels that wilderness designation would impose upon other area resources.

3.7.2 Noise

Technical Report No.8 details the analysis conducted relative to noise impacts associated with implementation of the proposed action and/or alternatives. In brief, noise generated from mine surface blasting and vehicle/equipment operation would be expected to be attenuated to below discernable levels within the Roberts WSA.

3.7.3 Visual Resources

As discussed in Technical Report No.8 visual observation of some Mt. Hope project activity (e.g., amber lights, downstream portion of tailings

dam surface (site 4-A), Kobeh Valley water supply power line) may be possible from within certain WSA land points with the use of an aided eye device. Such observation may be considered negative to some WSA visitors while others might consider it a reflection of the uniqueness of the WSA characteristics. The limited extent of identifiable visual resource conflicts has resulted in a determination of insignificant impact.

Specifically, visual resources within the WSA would not be affected as the proposed action does not include any form or type of physical activity within the WSA. The scenic and unique visual characteristics of the WSA (and significant area of surrounding non-WSA land) would not be affected.

Additional analyses of visual resource degradation, involving the Level-1 screening impairment analyses discussed in Technical Report No.3, Meteorology and Air Quality, indicate that atmospheric emissions associated with the proposed action would not significantly impact the Roberts WSA or Mt. Hope region.

Implementation of Alternatives 1 (land acquisition components), 2 (power line), and 5 (housing) were determined to represent impacts generally similar to the proposed action. Power line Alternates 2-B and 2-C were determined not to present the potential for impacts. Water supply pipeline routing 3-C represents an increased potential for visual observation of the supply power line from the Roberts WSA. Tailings pond alternate 4-C additionally represents a potential for increased areal extent of visual contrast. The impacts associated with both alternates were determined insignificant, however, due to the natural masking effects of pipeline vegetation growth allowance and topographic/vegetation screening from both within the Roberts WSA and from the site areas undergoing activity. Alternate 5-B, decentralized workforce, would pose less of a potential use demand as local population residency would be reduced.

CHAPTER 4.0
LIST OF REVIEWERS AND PREPARERS

4.1 Reviewers: Bureau of Land Management

MARK H. DAVIS, Area Wildlife Biologist

B.S. Biology, General Science, University of Wisconsin
M.S. Wildlife Management, University of Wisconsin, Stevens Point

Licensed Associate Wildlife Biologist. Experience includes four years with Bureau of Land Management; wildlife review and technical coordination.

DEAN HUIBREGTSE, Area Range Conservationist

B.S. Range and Wildlife Habitat, Washington State University, Pullman

Experience includes four years with Bureau of Land Management; grazing review.

JON JOSEPH, Area Outdoor Recreation Planner

B.A. Recreation Administration, California State University, Chico

Experience includes seven years with Bureau of Land Management; wilderness review.

TERESA McPARLAND, Area Geologist

B.A. Geology, Stephens College, MO.

Experience includes four years experience with Bureau of Land Management; coordinator, writer-editor; geology review.

JACK T. MATUSKA, District Forester

B.S. Forestry, Syracuse University

Experience includes four and one-half years with Bureau of Land Management; visual resource management and woodland products review.

JEFF RAWSON, District Wild Horse Specialist.

B.S. Range Management, Utah State University, Logan.

Experience includes five and one-half years with Bureau of Land Management; wild horse review.

NEIL D. TALBOT, Area Manager.

B.S. Range Management, Utah State University, Logan.

Experience includes twenty years with Bureau of Land Management; team leader.

ED TILSEY, Nevada State Environmental Specialist.

B.S. Wildlife, University of Montana.

Experience includes nine years in environmental protection with Bureau of Land Management; overall document review.

4.2 Consultants

ROBERT C. WYATT, Project Manager

B.S. in Biology, University of Miami
Post Graduate Study, Biology, University of Miami

Mt. Hope Project: Responsible for coordination of environmental discipline impact analyses (except cultural resources) and direction of the third party EIS scientific team; technical and regulatory (NEPA) oversight and management of EIS documentation; and liaison and coordination with the Bureau of Land Management (BLM) and EXXON.

Experience includes management and technical analyses of environmental impact studies involving surface and underground mines, nuclear and coal-fire electrical generating plants, petrochemical and mineral process facilities, and hazardous waste/nuclear disposal site regulatory analysis. Professional experience involving activity in 23 states, Mexico and Puerto Rico has included the technical critique and environmental discipline analysis of hydrology, air quality, chemical and mine engineering, terrestrial and aquatic biology, socioeconomics, land use, pollutant toxicity and regulatory compliance.

ROBERT C. ERICKSON, Wildlife Biologist

B.S. in Zoology, San Jose State College
M.S. in Ecology, University of Washington
Ph.D in Biology, University of Washington

Mt. Hope Project: Assisted in review and analysis of project impacts upon wildlife populations. Prepared wildlife technical reports, conducted site reconnaissance, assisted in liaison with government agencies.

Experience includes impact assessment and mitigation planning of faunal populations with regard to strip mining, water diversion, nuclear power, oil gassification and reservoir development projects. Has managed and prepared several large ecological environmental assessments for industrial and governmental entities. Professional career includes project activity within 23 states.

LESTER ALLEN KISH, Range Ecologist

B.S. in Fish & Wildlife Management, Montana State University
M.S. in Range Science, Montana State University

Mt. Hope Project: Technical analysis and field survey of project land vegetation, threatened and endangered species, and range conditions. Assisted in primary preparation and review of vegetational technical report including aerial photo interpretation (infra-red).

Experience includes professional activity as principal investigator/project leader on baseline and annual vegetation monitoring studies, range resource inventories, mapping and conflicts analysis of livestock grazing allotments. Professional experience has primarily involved analysis and assessment of mine operations in the western United States.

JEFFREY T. RYAN, Ecologist, Photo-interpreter

B.S. (associate) in Natural Sciences, University of Wisconsin Center System Marathon
B.S. in Environmental Sciences, University of Wisconsin

Mt. Hope Project: Responsible for infrared aerial photo interpretation of project land vegetation.

Experience includes eight years of aerial photo interpretation involving more than five million acres of land in the western and central United States. Project activity has emphasized environmental impact analyses for mining operations, including the determination of erosion condition classification via BLM soils surface factor criteria.

JOHN J. KNEISS, Environmental Analyst

B.S. in Biology, Wilkes College

Mt. Hope Project: Responsible for assisting baseline data acquisition programs, review of process plant environmental loadings and analysis of soils loss characteristics.

Professional experience includes environmental analysis in the technical disciplines of soil science, wildlife ecology, vegetation and hazardous wastes disposal. Site development and impact assessment work has entailed underground mining, deep well injection, chemical process lagoon and sewage treatment facilities planning.

RANDALL K. BUSH, Geologist/Data Analyst

B.S. in Geology, University of Houston

Mt. Hope Project: Assisted in the preparation and data abstraction required for EIS technical reporting. Coordinated EIS documentation relevant to mapping and quality assurance.

Professional experience includes technical writing and regulatory compliance documentation for numerous coal and mineral mines; technical critique of topographic and geologic data and support documentation; and land use analysis (physical environmental factors relevant to engineering planning).

DIANE YARBERRY, Data Coordinator

B.A. in Education, Texas Christian University

Mt. Hope Project: Responsible for baseline data acquisition, preliminary assimilation, and performance of literature search activities.

Professional experience includes the management supervision of several environmental, engineering and legal compliance documentation efforts involving major surface and underground coal mines; the performance of literature based data search and acquisition projects emphasizing the disciplines of hydrology, biology, soil and pollution control systems; and the analysis/communication of project-specific regulatory procedures.

CHAPTER 5.0
BIOTA GLOSSARY

Acid soil. A soil with a preponderance of hydrogen and aluminum ions in proportion to hydroxyl ions. Specifically, soil with a pH value <7.0.

Alkaline soil. A soil with a high degree of alkalinity or with a high exchangeable sodium content, or both. Specifically, any soil that has a pH value >7.0.

Animal unit month = AUM. The quantity of forage required by one mature cow (1,000 lb.) or its equivalent for one month.

Annual. A plant that grows from seed and produces seed in one growing season.

Bajada. The joining together of many alluvial fans to make a continuous apron-like feature of sediment.

Biota. Fauna and flora together.

Boreal. Of, relating to, or growing in northern and mountainous parts of the northern hemisphere.

Bunch grass. A grass that grows in tufts, in contrast to a sod-forming grass.

Candidate species. Those species recommended for and awaiting inclusion to the list of threatened and endangered species, but for which sufficient information is not presently available to biologically support a proposed rule or for which sufficient information does exist but the necessity of gathering data concerning the environmental and economic impact of listing and designations or critical habitats, development and publication of final rules will require several years.

Canopy. The uppermost spreading branchy layer of a tree, particularly a forest.

Climax vegetation (potential vegetation). The stabilized plant community on a particular site; it reproduces itself and does not change so long as the environment does not change.

Community. An association of interacting populations, usually delimited by their interactions or by spatial occurrence.

Depauperate. Falling short of natural development or size; of stunted growth.

Dicot = dicotyledon. A plant with two seed leaves; specifically, a member of the one (Dicotyledones) of the two subclasses of angiospermous plants that comprises those with two cotyledons.

Discing. A technique similar to plowing which not only turns the soil, but also physically uproots and crushes existing vegetation considered to be undesirable.

Edaphic. Pertaining to, or influenced by, soil conditions.

Endemic. Limited to or restricted to a specific locality or region.

Environment. Surroundings of an organism, including the plants and animals with which it intereacts.

Environmental impact. Effect of environmental loading on existing physical, biological and socioeconomic environment (e.g., change in air quality, groundwater quality or soil loss). These changes to the current or projected conditions may be beneficial, inconsequential or adverse.

Environmental loading. Emission from proposed action or alternatives that has potential to change existing environment (e.g., air emissions, effluent quality, areal disturbance, etc.).

Estivation. Reduction of biological activity by an organism during the summer; more generally, during periods that are hot, or dry, or both.

Eurasian. Of a mixed European and Asiatic origin.

Evapotranspiration. A term embracing the portion of the precipitation returned to the air through direct evaporation or by transpiration of vegetation, no attempt being made to distinguish between the two. (Langbein, W. B., Trans. Amer. Geophys. Un., vol. 23, pt. 2, p. 610, 1942).

Exotic. Introduced from another country: not native to the place where found.

Eyrie = Aerie. The nest of a bird on a cliff or a mountaintop.

Forage. Plant material used by animals as food, especially when taken by browsing or grazing.

Forb. Any herbaceous plant that is neither a grass or sedge. It is commonly grazed on western ranges.

Form. A slight depression which has been scraped out of the ground by a hare. It may or may not be partly protected by overhanging shrubbery. Hares frequent them and also give birth to their young in a form.

Grubbed. Having been cleared of roots and stumps by digging; having been dup up by the roots.

Habitat. Place where an animal or plant normally lives, often characterized by a dominant plant form or physical characteristic (i.e., the stream habitat, the forest habitat).

Halophytic. Of or pertaining to plants which grow in saline soil.

Herb. A plant that dies down annually or after flowering; grasses and forbs, as distinguished from shrubs and trees.

Herbivore. An organism that consumes living plants or their parts.

Hibernation. Reduction of biological activity by organisms during winter, or, more generally, during cold periods.

Home range. An area, from which intruders may or may not be excluded, to which an individual restricts most of its normal activities (see Territory).

Invaders. On range, plants that come in and grow after the climax vegetation has been reduced by grazing. Generally, invader plants are those that follow disturbance of the surface. (Most weeds are "invaders").

Isolation (ecological). Avoidance of competition between two species by differences in food, habitat, activity period, or geographical range.

Lek. A communal courtship area on which several males hold courtship territories to attract and mate with females; sometimes called an arena.

Micropyllous. Characteristic of plants which have a minute opening in their ovules through which the pollen tube enters.

Monocot. monocotyledon. Any of various plants of the Monocotyledonae, one of the two major divisions of angiosperms, characterized by a single embryonic seed leaf that appears at germination (e.g. grasses, orchids, and lilies).

Overgrazing. Grazing so heavy as to impair future forage production and to deteriorate plants, soil, or both. Contrasts with undergrazing.

Overstory. The layer of foilage in a brush or forest canopy; the vegetation contributing to an overstory.

Perennial. A plant that continues to grow for several to many years, producing flowers and seed after the first few years; a woody plant.

Phreatophyte. A plant that habitually obtains its required water supply from the zone of saturation, either directly or through the capillary fringe. (Meinzer, USGS WSP 494, p. 55, 1923)

Phytosociological. Relating to the branch of ecology that deals with the characteristics, relationships and distribution of associated plants.

Playa. The shallow central basin of a desert plain or valley in which water gathers after a rain and is evaporated. (U.S. Geol. Surv., Bull. 613, p. 184)

Range seeding. Establishing perennial grasses of improved reseeding grasses or legumes on rangeland to prevent the loss of soil and water and to restore the productivity of native grassland.

Raptor. A bird of prey (e.g., hawk, eagle, falcon).

Relictual. Of or pertaining to an organism or species of an earlier time surviving in an environment that has undergone considerable change.

Riparian. Of, on, or pertaining to the bank of a natural course of water.

Ruminant. Any of various hoofed, eventoed, usually horned mammals of the suborder Ruminantia, such as cattle, sheep, goats, deer, and giraffes, characteristically having a stomach divided into four compartments and chewing a cud consisting of regurgitated, partially digested food.

Saline-alkali soil. A soil that contains a harmful concentration of salts and exchangeable sodium; or contains harmful salts and has a highly alkaline reaction; or contains harmful salts and exchangeable sodium and is strongly alkaline in reaction. The salts, exchangeable sodium, and alkaline reaction occur in the soil in such locations that growth of most crop plants is less than normal.

Saline soil. A soil that contains soluble salts in amounts that impair growth of plants but that does not contain excess exchangeable sodium.

Scrub. A straggly, stunted tree or shrub. A growth or tract of stunted vegetation.

Sedge. Any of numerous plants of the family Cyperaceae, resembling grasses but having solid rather than hollow stems.

Shrub. A woody plant of relatively low height, distinguished from a tree by having several stems rather than a single trunk; bush.

Short-term impact. Impacts encompassing a 60-year period and based on an assumed mine life of 50 years and a reclamation success period of 10 years.

Special habitat feature. An anomaly or area within or adjacent to a larger habitat site which influences faunal population, movements or distribution and are classified as man-made or naturally occurring.

Talus. A slope formed by the accumulation of debris. A sloping mass of debris at the base of a cliff.

Threatened or endangered species. As defined by the Endangered Species Act of 1973, federally listed endangered species are those in danger

of extinction throughout all or a significant portion of their world range; federally listed threatened species are those likely to become endangered in the foreseeable future.

Understory. The plants of a forest undergrowth; an underlying layer of low vegetation.

CHAPTER 6.0
BIBLIOGRAPHY

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